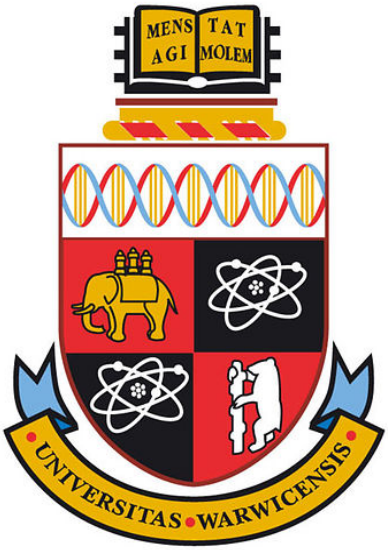
WARWICK
THE UNIVERSITY OF WARWICK



Planning in Practice for Resilience and Climate Change in Extreme and Extreme-ing Urban Environments

by

Melissa Jane Kenny

Thesis

Submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Urban Science

University of Warwick, Warwick Institute for the Science of Cities

December 2020

Contents

Acknowledgements

This thesis has taken many twists and turns to get to where it is now. The process hasn't always been straightforward and the year 2020 provided a unique set of additional challenges to overcome whilst in the final stages! I would therefore like to extend my gratitude to a range of people who have supported me over the years. Firstly, thank you to my supervisor Jon Coaffee for the regular advice, guidance and flat whites provided during my time at Warwick.

I would also like to acknowledge my colleagues at the Warwick Institute for the Science of Cities. I'd like to thank the wonderful Katherine and Liam for their unwavering support and friendship, and for doing the crossword every day with me, even during lockdown. Thanks also to Isy for her positivity and our weekends away, which always provided a nice distraction. I'm so glad we were all in the same cohort together. Thank you to John for his wise words and shared enthusiasm for pub quizzes. I'll remember my time at Warwick fondly because of you all.

Working from home during Covid was at times quite an isolating experience, I therefore have to thank my brilliant housemates Fil and Jonny for supplying encouragement, entertainment, and also plenty of wine, when required.

Thanks also to Julie and Cathy, for being great friends, from Sheffield to today, to wherever may be next.

In addition, I'm so lucky to be surrounded by my inimitable family. Thank you so much to my parents Alison and Mark, my grandma Barbara, and Missy, for always being there for me no matter what.

Finally, I gratefully acknowledge funding from the UK Engineering and Physical Sciences Research Council (grant no. EP/L016400/1), the EPSRC Centre for Doctoral Training in Urban Science.

Declaration

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by me and has not been submitted in any previous application for any degree. The work presented was carried out by the author. Parts of this thesis have been published as follows:

Ascott, K., & Kenny, M. J. (2019). Addressing the complexities of resilience in urban design and planning. *Town Planning Review*, *90*(5), 473-47.

Kenny, M.J. (2017). Urban Planning in the Arctic: Historic Approaches and the Potential for a Resilient Urban Future. In: Heininen, L., Exner-Pirot, H., & Plouffe, J. (eds.) (2017). *Arctic Yearbook 2017*. Akureyri, Iceland: Northern Research Forum.

Abstract

Resilience and climate action have evolved to become key priorities within planning policy and practice in many urban contexts, especially in relation to climate change and extreme weather; manifesting themselves within urban planning practice. In light of the increasing vulnerability to long and short-term climate related challenges, it is crucial to understand how resilience and climate action can be fully established within planning practice; at what scales should planners be involved and how can planning be integrated into other resilience related endeavours?

Like urban planning, addressing climate change in cities requires a long-term outlook. Beyond the environmental and physical nature of these challenges, there is a social aspect to the relationship between urban planning and climate change. The abilities of communities to cope with the distributional impacts of climate change in cities demands a multi-faceted approach from planners to engage with the complex interplay of resilience, climate change and a range of urban stakeholders, often with differing priorities. As resilience is growing as an urban planning concept, so too is the pressure for planners to fundamentally change the nature of their working practices to incorporate a more flexible and collaborative approach to resilience into their remit.

Based on the results of document analyses and semi-structured interviews from the case study cities of Anchorage, Alaska and Boston, Massachusetts, USA, this thesis explores the complexities of planning's engagement with the resilience agenda, focusing particularly on the production process of specific climate-related plans, to investigate the role planning plays in the resilience building process, and the differing approaches taken by extreme and extreme-ing cities to enact their visions of resilience. The thesis contributes to the urban resilience planning narrative, placing planning within the wider resilience agenda, highlighting shortcomings such as stakeholder communication and community involvement, whilst exploring planning's capacity to address siloed working environments and break down barriers to pursue meaningful and successfully implemented resilience solutions in increasingly vulnerable cities.

Abbreviations

ABCP – Anchorage Bowl Comprehensive Plan

ACP-CAP – A Climate of Progress – City of Boston Climate Action Plan Update

ALUP – Anchorage 2040 Land Use Plan

APA – American Planning Association

BHA – Boston Housing Authority

BPDA – Boston Planning and Development Agency

BRA – Boston Redevelopment Agency

BRAG – Boston Research Advisory Group

CAP – Climate Action Plan

CB-CAP – City of Boston 2019 Climate Action Plan Update

CC-CAP – Climate Change – The City of Boston's Climate Action Plan

CPTED – Crime Prevention through Environmental Design

CRB – Climate Ready Boston

DRR – Disaster Risk Reduction

FEMA – Federal Emergency Management Agency

GB-CAP – Greenovate Boston 2014 Climate Action Plan Update

HMP – All Hazards Mitigation Plan

ICLEI – International Council for Local Environmental Initatives

IMF – International Monetary Fund

IPCC – Intergovernmental Panel on Climate Change

LRPD – Long Range Planning Division

MAPC – Metropolitan Area Planning Council

MIT – Massachusetts Institute of Technology

MMCMB – Metro Mayors Coalition of Metropolitan Boston

MOA - Municipality of Anchorage

NGO – Non-Governmental Organisation

PCAP – Preliminary Climate Action Plan

RAR – Resilient Anchorage Roadmap

RCC – Resilience Cities Catalyst

SBCR – Sparking Boston's Climate Revolution

UAA – University of Alaska, Anchorage

UAF – University of Alaska, Fairbanks

UCCRN – Urban Climate Change Research Network

UMASS - University of Massachusetts

UNFCCC – United Nations Framework Convention on Climate Change

UN SDG – United Nations Sustainable Development Goals

UNDRR – United Nations Office for Disaster Risk Reduction

UNEP – United Nations Environment Programme

UNISDR – United Nations International Strategy for Disaster Risk Reduction

WAR – Welcoming Anchorage Roadmap

WMCCC – World Mayors Council on Climate Change

List of Figures

List of Tables

Chapter 1

Introduction

Figure 1. *LoPresti Park, East Boston (Author's own photograph)*

A statue in a park in East Boston, Massachusetts, overlooking the harbour and the downtown skyline, is emblazoned with Leon Krier's statement that:

> "A city is not an accident but the result of coherent aims and visions" (2009, p.101).

Taken from Krier's 2009 book, *The Architecture of Community*, the section just prior states that:

> "A city is not the inevitable result of a society's building activities. A city can be built and prosper only if it represents the goals of individuals, of a society and its institution" (ibid.).

As a "receptacle for life" (Alexander, 1965, p.428) cities, whether Boston or anywhere else in the world, are complex places with a multitude of physical, social, economic, and ecological challenges and vulnerabilities. The visions, aims, and goals that Krier identifies as crucial components of cities are shared by a broad range of stakeholders that would be incomplete without the processes and profession of urban planning. Often, when planners are not adequately represented, or planning is insufficient or maladaptive, the city as a receptacle to support life cannot efficiently function. In the contemporary period, this idea can be readily applied to the urgent threat of climate change upon cities, and the increasing vulnerabilities of cities themselves. In response, the way that planners approach addressing extreme climatic threats through contributing to the building of what, in the twenty-first century, has commonly been termed 'urban resilience', is growing in scope and scale. Resilience against climate change has now become a dominant urban policy rhetoric, and an important part of the pursuit of resilience relies on the capacity of urban planning (Van de Ven et al., 2016).

Today, "urban planning can be broadly defined as the organization of spatial structures to improve upon current or existing ones for the benefit of society and more recently, the environment" (Kenny, 2017, p.135). However, as the popularity of resilience as a planning concept continues to rise, so too does the pressure for the nature and practices of planning to change to incorporate resilience thinking.

Alcoforado and Matzarakis note that for cities dealing with addressing climate change "urban planning's role is of paramount importance to inform, coordinate and implement measures" (2010, p.23).

Climate Resilience and Planning

In relation to climate change, Bai et al. comment that "the science of cities is evolving", forcing urban planners to confront new challenges (2018, p.23). Cities are arguably some of the most vulnerable locations in the world when facing the impacts of climate change, whilst also being areas that are the most responsible for contributing to it; they consume over two thirds of the world's energy supply whilst producing over 70% of the world's greenhouse gas emissions, yet only occupy approximately 2% of global land area (World Bank, 2020; UN Habitat, 2014). This leads to many urban areas becoming locked into an infrastructure of high emissions (Intergovernmental Panel on Climate Change, 2018), resulting in almost inevitable climate change related impacts being a reality for many cities. As climate change has begun to more severely affect urban areas, those living and working in them increasingly face dealing with unexpected and unprecedented disruptions and challenges.

The ramifications of climate change upon cities are becoming increasingly frequent, and oftentimes more severe; the likelihood of acute disruptions to the functionality of cities and the livelihoods of those residing in them is also rising. Conventionally, planners have contributed to urban climate change response and helped reduce the vulnerabilities of cities, through actions such as vulnerability assessments, land-use regulation and producing climate action plans, but more is required (UN Habitat, 2014). Cities and planners must therefore build and enhance the capacity to respond to shocks and changes caused by extreme weather, as a result of climate change. As such, "urban planners have a unique responsibility in shaping the built environment and as such create solutions to the climate change challenge" (Preston-Jones, 2020, p.1049). Due to this increased responsibility, as the nature of planning changes, resilience has emerged as a dominant concept across planning practice, especially in relation to the impacts of climate change, arguably sparked by the use of

resilience as a key policy term on the world stage, by bodies such as the IPCC and the UN.

Since the turn of the century, a shift has begun towards a narrative of addressing climate change at the urban-level, and integrating resilience thinking into urban plans and policies. The publication of the 4th IPCC report in 2007, was one of the major catalysts for this. Together with the 5th IPCC report, published in 2014, planners were urged to develop empirical links between planning practice and climate change science (Dhar & Khirfan, 2016). Following this, a range of international initiatives, explored more in Chapters 2 and 3, have driven forward the climate change and planning agenda, promoting urban resilience across the globe. For example, the UN Sustainable Development Goals (SDG's), set in 2015, encourage the development of urban resilience plans in cities, in line with the Hyogo and Sendai Frameworks, produced by the United Nations Office for Disaster Risk Reduction (UNDRR).

In addition, the New Urban Agenda, that was adopted at the UN Conference on Housing and Sustainable Development in 2016, saw a range of urban stakeholders across different levels and spaces commit to building urban resilience throughout the world (Sharifi & Yamagata, 2014; Sharifi & Yamagata, 2018). As resilience has become a "pervasive idiom of global governance" (Walker & Cooper, 2011, p.2), its existence as a polysemic concept has allowed it to transcend across cities and stakeholders including urban planners, who are being confronted with the fundamentals of their profession being questioned as they work to integrate resilience into their professional practice. The burgeoning popularity of resilience as a planning concept, partly due to initiatives such as the Rockefeller 100 Resilient Cities programme, urges planners to adopt a more flexible and multifaceted approach, to work alongside other stakeholders that have been brought together under the umbrella of resilience, combining resources, knowledge and expertise to respond to climate change (Royal Society, 2014; Huck et al., 2020).

As urban planners are facing the reality of undertaking a paradigm shift in practice, broader practices beyond planning, such as communication breakdowns, knowledge

gaps and power dynamics have further emerged as themes that influence the implementation of resilience and may cause obstacles for planners to overcome in order to deliver enhanced resilience. In many locations, planning as a traditional professional practice is being fundamentally 'unsettled' in pursuit of urban resilience. For example, Carter et al. suggests that "resilience thinking challenges traditional approaches to environmental and spatial planning, and to the role of researchers in this process, raising questions over whether appropriate urban visions and governance structures are in place to develop effective adaptation responses." (2015, p.57).

The rise of resilience as a planning approach to combat climate change requires a reworked vision of urban planning, from a more rigid and regulatory mindset, where maintaining order and equilibrium is key, to a flexible, forward thinking outlook, incorporating a more "collaborative rationality", so that cities do not only 'bounce back' but 'bounce back better' (Filippi, 2018, p.27). Here, ongoing coordinated and methodical steps need to be taken to foster a new urban planning system that embraces change and the unexpected, acknowledging the dynamism of urban areas that are impacted by climate change (Sharifi & Yamagata, 2018).

Incorporating resilience thinking into the planning process requires overcoming a variety of roadblocks such as siloed working environments across cities and insufficient knowledge sharing between key stakeholders, as well as challenging the institutionalisation of planning practice itself. The urban governance system that presides over planners, regardless of the locality in which they are operating, is a key influence in the resilience planning process. Urban governments affect planners and are in turn influenced by the dominant political culture of the city and country, meaning that in terms of addressing climate change, the capacity of planners is equally as important as the commitment of political players, and their willingness as 'change agents' to prioritise resilience and climate action (Engle, 2011; Carter et al., 2015; Filippi, 2018). Focussing upon these changing governance processes is arguably a key facet that contributes to a better understanding of the role of planning within resilience, both now and in forthcoming decades.

Climate Resilience in the USA

The empirical research for this project focusses on the USA and is based on the two cities of Boston, Massachusetts and Anchorage, Alaska. These two cities are some of the many US (and global) cities facing the increasing threats of climate change and looking to planning and climate action plans as a tool in the process of building resilience. There are, unfortunately, a range of existing cities in the USA that exemplify the climatic vulnerabilities and importance of a competent and comprehensive approach to urban planning and resilience, explored in this thesis. For example, in New Orleans in 2005, the devastating aftermath of Hurricane Katrina highlighted the disastrous impacts of negligent and poorly regulated urban development, and inadequate planning response in the face of extreme conditions. For urban leaders across the country, Katrina signalled the urgent need to use planning more effectively to respond to climate change and extreme event (Horowitz, 2020).

Twelve years later, Hurricane Harvey's pummelling of Houston in 2017 provided more insights into how a devastating extreme event can be exacerbated when a laissez-faire attitude to planning and zoning, along with unchecked development in vulnerable areas are allowed to occur; evidencing that the vast steps required post-Katrina have not been taken. Prioritising development above all else, coupled with the air of federal disinterest where climate change is not regarded as a legitimate threat, led to Houston being somewhat helpless to the impacts of Harvey. The hurricane resulted in over 100 deaths, over 32,000 evacuees and upwards of $125 billion in damage, along with a drawn out and inadequate response (Sebastian et al. 2019). In Houston, maladaptive approaches to urban planning were present prior to Harvey; unfettered, profit fuelled, sprawl was allowed to occur on floodplains. Responses to the hurricane were marred by a lack of clarity and accountability regarding who was in charge, forcing residents to rely on themselves and 'DIY' approaches. Subsequently, a year after Harvey, Houston joined the (since disbanded) Rockefeller 100 Resilient Cities Network to work towards embedding long-term, future-looking, resilience thinking into all aspects of the cities' urban planning approach. Like many cities across the US, Houston has now produced a citywide

resilience plan to attempt to withstand and recover from shocks and stresses, as planning becomes an increasingly crucial aspect of climate action, and resilience grows as a key concept in planning and beyond.

The experience of Houston serves to herald the growing 'to-do list' for planners who are working to build resilience. It highlights the volume of challenges planners must overcome to ensure not only that cities are prepared for climatic shocks and stresses, but also that responses are cohesive across different scales. Here, "national politics is…central to encouraging a culture within planning that prioritises resilience" (Coaffee, 2019, p. 221). However, in the USA, as this study will demonstrate, political intransigence and contentious governance choices at the Federal level, such as removing the country from the 2015 Paris Climate Change Agreement, and broader climate change denial narratives, have meant that resilience and climate action have increasingly become the primary responsibility of city-level actors, including urban planners.

Project Overview

The changing nature of urban planning and the shift to city-level resilience as a priority in the face of climate change, has guided the research for this thesis. The examples of New Orleans and Houston provided vignettes that illuminated the pitfalls of poor planning in response to climatic extremes, and the requirement to build planning capacity to pursue meaningful resilience. As planners are urged to adjust their outlooks and working practices, the associated challenges this brings serve as themes that shape the narrative of the thesis.

As well as climatic shocks and stresses, the growing area of planning-focussed urban resilience must contest with increased knowledge, and wider knowledge-gaps, more urgent timescales and a range of different stakeholders, with potentially clashing agendas, creating a difficult governance arena in which to navigate (Füssel, 2007). Working against the overarching political narrative of indifference to climate change, puts increasing importance on urban governments to support climate change, requiring committed leadership. Additionally, the increase in stakes, and

stakeholders can contribute to siloed working, when collaboration and knowledge sharing is required. In this context, this thesis focusses on how urban planning is being used as tool for the resilience building and climate action plan making processes. The challenges posed above transcend the narrative of the research to provide a rounded view of how planners seek to negotiate planning for urban resilience in practice. Resilience literature and research still lack empirical work regarding the interpretation of resilience in professional and policy arenas, particularly urban planning, as well as how resilience in the urban context can be developed (Shaw & Sharma, 2011). In 2012, Wilkinson observed that "there are surprisingly few publications that address how a resilience approach to planning might be pursued in practice." (p.152). Since then, though resilience, as a concept itself and within urban planning has become the subject of more academic studies, the research in this thesis takes a more specific look at the longitudinal, context specific, approach planners in specific extreme and extreme-ing cities take during the resilience planning process (Coaffee et al. 2018).

Extreme cities, for the purpose of this project, are those that are located in environments with extreme characteristics, such as particularly harsh climates or especially remote locations. These cities have been developed in extreme environments and as such, are more used to coping with the related challenges. Nonetheless, extreme cities are also vulnerable to climate change, which could potentially exacerbate their extreme conditions. The city of Anchorage is described as an extreme city in this research, due to its remote location, disconnect from the contiguous USA, reliance on transport infrastructure, proximity to the Arctic circle, and harsh weather conditions.

For this research, the term 'extreme-ing' was developed and applied. It pertains to cities that are facing increasingly severe shocks and stresses as a result of climate change, both long and short term, but primarily concerning a growing frequency and severity of extreme weather events. These cities are not located in traditionally extreme environment and tend to have more temperate climates and be located in more populated and accessible areas, with closer proximity to other urban settlements. Extreme-ing cities are aware of the climatic threats coming their way, as well as how vulnerable they are to these threats, and are therefore taking steps to

plan accordingly by taking action such as publishing climate action plans. For this research, Boston is defined as an extreme-ing city, due to the growing frequency of coastal storms, vulnerability to the potential catastrophic effects of sea level rise and its recent publication of a resilience plan.

The following section outlines the overarching aim and objectives of the project, and the approach taken to undertake the research. An outline of the structure of the thesis is then provided.

Aims, Objectives and Approach

Huck et al. noted that "little is known about how policymakers and planners approach the challenge of operationalising urban resilience or what problem they face" (2020, p.2). To begin to address this, the research in this thesis takes a 'future looking' approach, investigating the resilience 'journeys' of the case study cities of Boston and Anchorage, and in particular analysing the specific climate change and resilience related plans produced by planners and other urban stakeholders in the respective cities. Throughout this project, when 'planners' or 'urban planners' are referred to, unless otherwise specified, this is in reference to public sector planners, primarily those working at the municipal level. When other 'urban stakeholders' are referred to, this can generally be taken to mean a combination of the following: urban governments, non-governmental organisation representatives, community groups, and private sector planners and developers. Table 1 shows the overarching aim and three key objectives of the project.

This thesis seeks to understand these different urban resilience approaches by tracking the planning processes in both cities, to investigate how planning is used to facilitate the building of urban resilience, and how this differs between extreme and extreme-ing contexts. The empirical research aims to elucidate the practical use of urban planning as a profession and tool within the resilience approach of cities. In addition, the study seeks to understand, in-depth, the key challenges faced, and requirements needed for cities to continue to pursue meaningful future resilience, and the influence that the extreme or extreme-ing nature may have on this.

More specifically, comparisons are drawn between earlier approaches to planning for climatic extremes, with the rise of resilience and modern planning practice, to understand the impact this has had upon planning practice. The particular roles that planners play within the broader urban resilience agendas of Anchorage and Boston are also explored, providing an opportunity to analyse the challenges planners face during city-wide resilience building processes. A comparative approach is adopted to investigate how much a city's context and experience of extremes can influence the version of resilience being pursued, and what other factors may shape a city's resilience approach.

Overarching Project Aim
To investigate and understand the role that urban planning plays within the resilience building and climate action planning process in specific city contexts.
Objectives/Research Questions
• To what extent have planners been historically involved in wider processes of mitigating and adapting to the effects of climate change in cities?
• What roles are planners taking in newer, future-looking resilience building processes?
• How do visions of, and approaches to, resilience differ between extreme and extreme-ing cities?

Table 1. *Research Aims, Objectives and Questions*

These aims and objectives are tackled through two in-depth case studies, framed by a qualitative methodological research approach. This combines semi-structured interviews carried out during fieldwork in Anchorage and Boston with a comprehensive document analysis of resilience planning documents from both cities, to build a detailed narrative of, and insight into, resilience and climate action planning processes in Boston and Anchorage.

The outcomes of this project contribute to the growing body of literature that places urban planning within the wider resilience agenda, to understand how the facilitation of planning can be improved to build resilience and address climate change

alongside other urban stakeholders, whilst uniquely focusing on extreme and extreme-ing locales.

Thesis Structure

The thesis is made up of 8 chapters. Following the introduction, two literature review chapters are presented. Chapter 2 focusses on the notion of urban planning in extreme conditions, taking a historical approach to investigate how planners dealt with climatic hazards prior to the popularisation of resilience as an urban planning term. Areas such as the Arctic are looked at to see how locations that suffered from extreme conditions were developed by innovative planning techniques. Beyond this, the notion of risk, and the emergence of climate change as a global concern, and planning's role in addressing it, are presented, highlighting the 'pre-resilience' approaches of planners.

Chapter 3, the second literature review chapter, looks in detail at the rise of resilience as a response to climate change, and urban planning as a tool to deliver resilience. The issue of defining resilience is discussed and the question, 'what is a resilient city?', is interrogated. The planning focus continues and the capacity for planners to undergo fundamental changes to embed resilience into their practice is explored. Following this, the main challenges that planners and other relevant urban stakeholders face in the resilience implementation process are introduced, helping to frame the empirical and discussion portions of the thesis.

After the literature reviews, Chapter 4 outlines the background and rationale for the qualitative methodological approach adopted. The chapter also provides a description of each stage of the research, detailing the fieldwork experience, qualitative interview process and document analysis process. This chapter also provides a brief overview of the US planning system prior to the case studies being presented.

Chapters 5 and 6 contain the main empirical body of the thesis. The two case studies of Anchorage and Boston are divided into separate chapters that follow the same

structure of providing contextual information about the cities before presenting the empirical data. In both Chapters 5 and 6, resilience planning documents are analysed chronologically, and the interview and document analysis data are intertwined to expound the detailed narrative for each case study.

Following the separate case study chapters, Chapter 7, the discussion chapter, brings the findings from Anchorage and Boston together to provide a comparative discussion and to extract similarities and differences that lead to lessons for urban planners. Chapter 7 also opens out the discussion beyond Anchorage and Boston to include the wider global resilience context.

After this, Chapter 8, the conclusion chapter, draws together the literature and empirical research to reflect on the aims and objectives of the thesis and answer the research questions.

Chapter 2
Planning and Extremes

History of Urban Planning and 'Pre-Resilience' Approaches

Cities across the world are vulnerable to a range of risks and it is impossible to completely protect them in all aspects. To avoid injuries and death amongst urban populations, as well as lessen damage to property and infrastructure, and negative economic impacts, cities increasingly need to be able to cope with an array of unpredictable hazards and risks. Hence, urban resilience emerging as a central idea in the early 21st Century (Godschalk, 2003). Before understanding resilience and its emergence as an urban planning concept, it is useful to first begin to explore the history of urban planning, and how planners conventionally dealt with shocks and stresses prior to the rise of resilience.

Whilst the history of urban planning can be traced back to Ancient China, and then the Greco-Roman Empire, through to Medieval Europe and the Enlightenment period, it was not until the emergence of modern urban planning in the late 19th and early 20th century that a considerable shift occurred which has shaped urban planning as we know it today. The modernist planning approach was distinctly oriented to the future and was focussed on the desire and need to control the urban realm and prescribe life within it (Davidoff, 2003). Connell notes that, "by the start of the 20th Century, the professional practice of planning embodied society's belief in its ability to control a discernible future" (2009, p.93). This extends to historic approaches to planning for risk, particularly environmental or climatic, where planners have long attempted to use their practice as a way to normalise the future in pursuit of the modernist planning paragons of stability, equilibrium and control (Coaffee, 2019).

Early planning approaches, at the turn of the 20th Century, used the practice as a way to control and engineer urban areas and urban populations, as well as to attempt to improve health and living conditions. For example, Ebenezer Howard, used the profession to attempt a solution to poor living conditions in urban centres. Howard's

Garden City movement trialled the decentralisation of workers and the provision of greenspace in a utopian effort to improve the livelihoods of city dwellers. This movement inspired planners in the USA and helped shape what we now recognise as the car-reliant suburban neighbourhoods that surround modern American cities (Fishman, 1982). The City Beautiful movement in the USA, in the late 1800's and early 1900's also attempted a form of social engineering through planning, advertising civic grandeur and trying to create a harmonious social order through beautification. These movements were later criticised by people such as urban activist Jane Jacobs, for their lack of humanity and detachment from the everyday life of urban citizens and communities (1961).

These large-scale planning efforts were intent on achieving, and most importantly maintaining, optimum urban spaces, with a focus on order and control. This is reflected in the evolution of planning for risk, before resilience. As a recognition of climate change and environmental risk in cities grew in the mid 20th Century, a technocratic, scientific approach to planning was an "explicit exercise in imagining the future" (Healey, 1996, p.242). By predicting the future, 'business as usual' could return as quickly as possible in the aftermath of a disaster though quick, short-term fixes (Connell, 2009). Akin to the grand planning movements of the early 20th Century, planning for risk before the 21st Century was less focussed on the social aspects of risk, in the way that resilience is today.

Planning has long had a reputation as a strict and bureaucratic profession, and its relationship with risk and the environment has been one of 'command and control'. The rise of resilience, that is explored later in this chapter, has challenged these traditional notions of planning. The unpredictability and uncertainty of risk in the 21st Century has also undermined planning's rigid and prescribed approach to the future by shattering the ideas of equilibrium and stability. There is now a requirement for transformation, adaptation and a version of planning that has a long-term and inclusive outlook.

The remainder of this chapter will unpack the ways in which planning practice has engaged with the notion of risk. The first section will continue to explore planning

and its relationship to environmental and climate related risk factors, by looking at how planners historically operated in, and manipulated, extreme environments, such as the Arctic. Second, the chapter will look at how planners approached climatic challenges and risk in the 20th Century, as climate change began to be recognised as a major threat to cities. Third, the evolution of risk and planner's responses to this are explored, before an investigation into the transition from risk to resilience in 21st Century planning practice.

Planning and the Climate

Narrowing the planning focus down to look at extreme environments, investigating how planners have dealt with these harsh locations can begin to shed light on the relationship between planning and the climate, before the impact of climate change on planning, and the rise of resilience is explored later and in Chapter 3.

There is not a wealth of literature available that comprehensively documents early historic approaches to urban planning for climate adaptation and climatic hazards before the 20th century (Lawler, 2009). This is reflected in the fact that there is extensive literature on how only more recently, the nature of modern planning is having to change to incorporate climate change and resilience thinking into planning practice (Hurliman & March, 2012). Nonetheless, it is important to understand the relationship between planning and the environment and climatic changes, including planning in extreme environments and the pre-resilience approach planners took to address urban shocks and stresses. Hunt and Watkiss suggest that the "use of data relating to historical extreme weather events, and their changing frequencies under climate futures, are increasingly used to quantify…risks." (2011, p.35). This means that understanding how to create a resilient future can be helped by looking at history to explore how places and systems have previously achieved or strived for resilience.

According to Wamsler, "looking at the history of cities, the correlation between urban planning and natural disasters is obvious" (2004, p.15). Planning alters space and the way it is used; in the past this was often with the intention of increasing

connectivity and productivity, or as a form of defence, predominantly against human threats (Wilkinson, 2011).

The following sections will explore varying historical manifestations of planning in relationship to the environment and climate, first as planners sought to colonise extreme environments, particularly as a way to manipulate and exploit nature; viewing the environment as a challenge to overcome.

Planning in 'Extreme' Environments

This section will briefly look at some examples of planning in traditionally extreme environments as an exploration of planners working to attempt to master nature through the built form. In particular, the Arctic and the desert are used as examples of planners trying to control and manipulate the environment, for experimental purposes or for economic reasons such as resource exploitation (Bannova, 2014). Early planners operating in extremes often focussed more on innovation and experiment, manipulating the environment because they could, or for a benefit, not because they had to because of the threat of climate change (Hansen et al. 2013). The examples given show how many planners held a "deep-seated anthropocentric view of nature, and of human as its steward or even its master" and early approaches to planning in extreme environments could be viewed as "the most explicit manifestation of this human centred view" with the "persistent utilitarian treatment of the environment as a storehouse of resources and functions for human exploitation" (Davoudi, 2012, p.14).

The extreme examples presented below show how planning has been used to develop urban areas *in spite* of the environment. This will provide historical context for the extreme case study city of Anchorage, presented later in the thesis, and to begin to look into the relationship between planning and the environment, particularly in terms of planning as a form of control or stability.

The Arctic provides a good illustration of how planning historically was practiced in an extreme environment. Despite being a remote and relatively inhospitable region,

the Arctic has experienced significant urbanisation and planning. This is particularly due to its rich resource availability, use for strategic military activity and the opening up of trade routes. Predominantly, urban development and planning in the region was focussed on industry and most settlements grew near sites of industrial activity. With central governments in Arctic nations often being based far away from the Arctic settlements, planning was often disconnected because of the region's remoteness, and therefore more reliant on experience and tradition. Planning was historically used in quite a restricted and reactive manner, due to the limitations of the physical environment and harsh, volatile conditions (Bannova, 2014).

For planners, extreme regions also presented the opportunity to experiment and exhibit, and the Arctic gave planners and architects a unique 'canvas' upon which to test varying planning approaches, in order to try and control extreme environments through methods of experiment and innovation. In the 1970's, British architect and planner Ralph Erskine attempted to create a 'modern utopia' in the Arctic, designing a fortified town in Resolute Bay, Canadian Arctic, to help integrate indigenous communities with oil workers whilst creating a micro-climate for the town, though encompassing the settlement in a large horse-shoe style structure, resembling a fortified town (Løkken & Haggärde, 2016; Kenny, 2017). Erskine's plan may have revolutionised physical and social planning in an extreme environment had it come to fruition, instead it highlighted "the problem of the relationship between geographic realities and the world of imagination" (Wynn, 2009, p.19). Other ambitious plans and proposals in the Arctic, such as a 1958 plan to put a massive dome structure over the town of Iqaluit in Canada, shared modern planning's preoccupation with controlling and engineering the future, in this case in defense against the extreme Arctic climate.

In terms of resource exploitation as a reason to develop urban settlements in extreme environments, there are also Arctic examples, such as the city of Norilsk in northern Siberia, Russia. Growing from a Gulag camp in the 1930's, set up under Stalin's rule, the city's industry centres on nickel mining. Since 1939, Norilsk has had a master plan. The original plan for the city took little into account other than resource extraction and industrial growth (Kenny, 2017). The city was planned to maximise

industrial output and survive the extreme Arctic conditions; high-rise, uniformly ordered blocks of buildings served to withstand strong winds and snowstorms (Nelson et al. 2002). Today, the city is still characterised by a harsh and repetitive monolithic urban form, akin to Soviet-era architecture.

Whether for experimentation or exploitation, and though often displaying large amounts of innovation, past planning attempts in the Arctic often clashed with Arctic vernacular and failed to address the sociocultural side of urban life. Instead, planning in this extreme environment often took a totalising approach, determined to control and capitalise on the environment, as opposed to planning in harmony with it (Kenny, 2017).

In contrast to the Arctic, a more recent example of planning in an extreme environment is the city of Dubai in the United Arab Emirates, also an initial result of resource exploitation that has become a major city that stands as a testament to expansive urban development despite its desert surroundings. Booming after the discovery of oil in the mid-1960's, Dubai has emerged out of the sand at a meteoric rate, providing the rationale for its development and the focus on ostentatious mega-projects (Rizzo, 2014). Pacione suggests that there is an "entrepreneurial approach" to planning in the city, that "produces a city plan that is, in essence, a spatial expression of economic strategy" (2005, p.264). For Dubai, planning in an extreme environment is not the result of necessity; instead, it could be argued it is the result of an influx of wealth and the desire to display it. Projects such as the Burj Khalifa, the tallest building in the world, and the Palm Jumeirah manmade archipelago are notable examples of major engineering and environmental manipulation that defy the harsh and extreme surroundings; working against nature to achieve extravagant feats of planning, architecture and design. In fact, the terms 'Dubaification' or 'Dubaisation' have been coined to refer to other cities' emulations of the megaprojects that dominate Dubai's urban landscape, despite the extreme environment (Koelemaij, 2020).

The rapid development of Dubai has however placed enormous environmental strain on the city and surrounding area. The pursuit of 'prestige urbanism' in this city has

out-prioritised the requirement for a robust and resilient planning system (Choplin & Franck, 2011). The rapidity at which the city grew and the delicate nature of the flora and fauna in the area, like the Arctic, produce various environmental challenges for planners, who must balance the desire to grow as a world-class city with stewarding the extreme environment in which it is located (Alawadi et al. 2016; Ali, 2016). Here, the desire to control the environment has resulted in an artificial city that has been developed by manipulating and exploiting the surroundings.

As stated before, more specific examples of urban planning in extreme environments are limited in the literature available. There exist however, other examples of humans attempting to, or being forced to, manipulate the environment in order to benefit from the outcomes. One instance is the historic land reclamation efforts in the Netherlands, where wetlands were drained to form the polders that are now synonymous with the Dutch landscape (Wagenaar, 2006). This form of "offensive water management" (Schuetze & Chelleri, 2011, p.1), was enabled by the technological advancements of the mid to late 19th Century and employed comprehensive engineering techniques to plan against nature in order to develop agricultural land and space for towns and cities to develop; today, water management is still an integral part of the Dutch planning approach (Spoormans et al. 2019). The success of the polder developments, as large-scale land reclamation feats meant they were viewed as national showpieces by the Netherlands (Renes & Piastra, 2011). This is somewhat reflective of the 'prestige urbanism' developments in Dubai, showing how planning in extreme environments could be viewed as an opportunity to showcase techniques or exhibit prosperity.

More recently, parts of the Amazon rainforest, another extreme environment, have become more urbanised. The Brazilian city of Manaus is sprawling into the rainforest as a result of insufficient urban planning to control the spread of informal settlements in the peri-urban area that borders the city and the Amazon (Ramos et al. 2018). These informal settlements are expanding into the rainforest, leading to major environmental degradation and deforestation; the city and the rainforest are not existing in harmony. Due to the sprawl on the metropolitan periphery of the city, Kenai (2014) dubbed the Amazon an "urbanised forest" (p.1075). This shows how

planning can be a facilitator of control and development but also a hindrance to progress and potentially detrimental to the environment. In the case of Manaus, the urbanization of the extreme environment of the Amazon rainforest is occurring out of necessity, and the lack of a formal system of planning. This is in contrast to the other extreme examples in this section, where planning has tended to be used to showcase techniques and achievements. Nonetheless, the end goal still revolves around the mastery of nature to facilitate urban development.

From deserts to Arctic tundra, the examples have shown that cities have grown in extreme environments, despite the harsh challenges. As a result of climate change, extreme environments are becoming more so and new threats are appearing. The examples in this section serve to exemplify the innate human desire to conquer and control the unknown, a desire that has particularly manifested itself within urban planning. In the various extreme environments discussed, the planning focus has primarily been on innovation and exploitation to reconfigure the environment and work against nature, rather than making room for it. Attempts to control the environment begin to break down in the face of complexity and unknown future risks (Pearce et al. 2012; Kenny, 2017).

The chapter now turns to look towards climate change as a consideration for cities and planners, tracking the emergence of climate change (as a planning issue) and continuing to explore the relationship between planners and the environment.

Climate Change and Environmental Planning up to the 20th Century

Whilst planning for climate change is still a relatively new concept, the awareness of climatic impacts relating to cities is a well-established idea. The late 19th Century saw some initial steps being made towards connecting environmental and climatic issues with the built environment and ameliorating impacts. In Victorian Britain, Luke Howard published 'The Climate of London' in 1818, one of the first recoded instances that recognised how urban areas can impact local climates, such as the recognition of the phenomenon that became known as the urban heat island effect (Mills, 2008).

Early acknowledgements of the relationship between the climate and urban areas can be broadly attributed to the work of meteorologists such as Howard, and other related climate science professions, rather than planners. This early work became increasingly prevalent after World War II, following the air of optimism for urban reform and the linked narratives of urban areas and climate continued. In 1945, Czech-American oceanographer Eric B. Kraus published an article in the *Quarterly Journal of the Royal Meteorological Society* that stated: "In their towns men have also altered the natural climate to a remarkable degree" (p.402) (presumably women also contributed).

In the post-war period, beyond climatic considerations, most emergency-related planning activity around the world was still focussed on national security and the threat of nuclear war (Mills, 2008). From the 1960's onwards, there was however an increasing consideration of climate science and the ability to share knowledge, as organisations such as the United Nations allowed scientific data to become transnational (Wakeman, 2014). Population growth and urbanisation were also expanding rapidly, and the effect this was having on the environment was increasingly being noticed, with planning seen as a significant mediating factor. As noted by climatologist T.J. Chandler in 1976:

> "…faced with the exponential growth of the world's population and the accelerating pace of urbanization it is clear that our cities must, where appropriate, *be purposefully planned in order to optimize the environment* of urban areas and avoid a series of structural and functional design failures. *Climate is an essential element in this planning*" (p.12, emphasis added).

The 1970s also saw two UN Conferences in Stockholm (1972 – Human Environment) and Vancouver (1976 – Human Settlements), the outcomes of which led to the creation of the United Nations Environment Protection Programme (UNEP) and UN-Habitat, respectively. The first World Climate Conference, by the World Meteorological Organisation also took place in 1979. All three of these conferences began to address planning's role within the wider climatic agenda. The

Stockholm conference noted underdevelopment of urban areas as an exacerbator of natural disasters[1]. This was built on in the Vancouver conference and the *Stockholm Declaration on the Human Environment* that followed it in 1973, where it was suggested that planning should be used to avoid development in known hazardous areas. The document also noted that "until methods of forestalling natural disasters are improved, and until war is eliminated, governments are faced with the problems of reconstruction and rehabilitation of severely damaged settlements" (p.14). The idea of rebuilding after a natural disaster hints at an early version of resilience, in the document it was advised that the reconstruction after a natural disaster should be used as a chance to improve upon the function of the settlement. Early notions of bridging the gap between climate science and planning, a challenge that still ensures today, were also introduced in the report following the World Climate Conference: "development planning for…human settlements could be markedly improved by more effective use of climatic information" (1979, p.9).

Climatic considerations in cities continued to grow in prominence in the latter half of the 20th Century. Key international interventions such as the publication of the *Brundtland Report* in 1987, and the formation of the IPCC in 1988 shone a light on ideas of 'sustainability' and served to raise awareness of climate change issues. The related concept of sustainable development that emerged from these early discussions has been called the "object of planning's fascination" that acted as "a lightning rod to focus conflicting economic, environmental and social interests" (Campbell, 2007, p.2). This focus on combining considerations under one umbrella term signified a shift to a more global perspective of risk, which is discussed in the following section. Similar to resilience, the ambiguity of the definition meant that "although everyone was in favour of it, nobody knew exactly what it meant" (Hall, 2002, p.412). For most, sustainable development was interpreted to mean pursuing stability and focussing on an anticipation of environmental challenges in order to maintain the status quo. The publicity that the *Brundtland Report* gave to sustainable development led to a particular focus on the environmental aspect of the concept. This challenged planning to move from a more 'protectionist' role, to working with,

[1] The term 'natural disaster' is now widely discarded due to the blame it places upon nature, 'freak' events or 'acts of God', rather than poor decision making by a range of stakeholders including planners.

and enhancing, the environment though activities such as low emission developments in order to address climate change (Rydin, 2003).

The 1990's saw an acceleration of international attention on climate change and risk. In 1990, the IPCC published the *First Assessment Report*, and a supplementary report followed in 1992. These two reports presented initial ideas of mitigation and adaptation in the wake of risking carbon emissions and growing concern about the greenhouse effect. A quick search of the 1990 and 1992 reports show that planning as a profession is not specifically alluded to. Cities themselves are noted in terms of the relationship between urbanisation and growing emissions, though "impacts of climate change on urban areas and other human settlements" is identified as an area to be considered in the future (IPCC, 1990, p.11; IPCC, 1992). Scenarios were however used comprehensively to anticipate future uncertainties based on projected emissions and other predictions such as global temperature rise. These scenarios tended to compare a 'business as usual' future with options for example a 0.1°C rise in global mean temperature versus a 0.2°C rise in an effort to map out responses to the various potential outcomes (IPCC, 1990; IPCC, 1992; Girod et al. 2008). The 'business as usual' approach, is reflective of how risk was framed at the time, focussing on developing quick-fix responses that manage and maintain stability, rather than a more potentially transformative, long-term, process like resilience. Following the IPCC reports, the United Nations Framework Convention on Climate Change (UNFCCC) came into effect in 1994 (this treaty was added to with the Kyoto Protocol in 1994 and superseded by the Paris Agreement in 2016).

The narrative of disaster risk reduction (DRR) also took hold in the 1990s. This decade was UN International Decade for Natural Disaster Reduction and saw events such as the 1994 World Conference of Natural Disasters and the subsequent adoption of the Yokohama Strategy, which focussed on preparedness and mitigation, indicating a conceptual shift from reaction to prevention (Manyena et al. 2011; Quarantelli, 1995). At the time however, many believed DRR actually acted as a barrier between planning and addressing climate issues. The separate DRR discourse served to alienate planning and encouraged a disconnect, rather than bringing the professions together to work collectively (Wamsler, 2008). As a result, urban

planning as a tool for risk reduction was not comprehensively recognised and often failed to fall under planner's remit, as the interconnectedness went unrecognised and planner's responsibilities regarding climate-related risk were reduced to zoning and regulatory practices (O'Brien et al. 2019). In addition, it was suggested that global development and reconstruction programmes focussing on DRR, and funded through the International Monetary Fund (IMF) and the World Bank structural adjustment programmes, contributed to this alienation of planning (ibid.).

As climate change begun to be recognised as a legitimate threat in the late 20th Century, comprehensive global efforts were undertaken to address it. Urban planning as a profession was not always recognised as a key player within these efforts and its presence in the wider agenda of tackling climate change and environmental issues at the urban level remained somewhat ambiguous. This was partly due to planning for climate change being in competition with the economic drive behind urban development and planning, coupled with the broad level scientific approach, meaning that climatic considerations did not sufficiently take purchase in cities before the turn of the century, with profit being prioritised and local-level requirements being overlooked (Hebbert, 2014).

Redefining Climate Risk

The hopes of the *1973 Stockholm Declaration*, that disaster events could be forestalled or eliminated, unfortunately have yet to come to fruition. As the 20th Century progressed, the idea of risk also evolved to become an omnipresent threat that could not be neatly predicted and planned for, within the traditional bounds of earlier planning and risk management attempts. The notion of 'Risk Society', popularised by German sociologist Ulrich Beck, suggested that risk is the predominant product, rather than side effect of modern industrial society. The idea was posited in the aftermath of the 1986 Chernobyl disaster, an event that showed how risk disregarded national boundaries, with large scale risks being viewed as increasingly volatile, unpredictable and incalculable. The threat of catastrophic events meant that contemporary risk, notably the impacts of climate change, was increasingly viewed as excessively expensive to insure or in some cases un-

insurable, as such risk could no longer be neatly managed (Coaffee, 2019; Dlugolecki, 2000).

British sociologist Anthony Giddens built on the notion of risk society, defining it as "a society increasingly preoccupied with the future (and also with safety), which generates the notion of risk". This preoccupation is clear when looking particularly at the 1990's and the expansion of risk related action in response to climatic and environmental issues such as extreme weather events, as a result of human-caused activities, reflecting a growing "widespread feeling of living in an epoch of uncontrollable risks and equally great uncertainties" (Leccardi, 2003, p.35).

Decision making in a Risk Society

Living in a 'risk society' significantly impacts how decisions, planning related and otherwise, are made. An exponentially increasing exposure to risk can create fear or foster denial, and inform action and reaction to threats (Gardner, 2009).

Kahneman (2011) suggests that in the face of risk or threat, there can often be a bias towards optimistic decision making, as this allows the decider to create an illusion of control. This links to the earlier planning priorities of 'command and control' that have been discussed. Kahneman also notes the idea of the 'planning fallacy'. Whilst not strictly linked to urban planning, this fallacy can mean that costs are underestimated in favour of overestimating benefits, leading to uninformed or insubstantial planning efforts to cope with risk.

To further unpack planning and decision making under risk, it is important to acknowledge the denial of risk, particularly climate change, as this can have disastrous and far-reaching negative consequences, especially when promoted at high levels of influence. Cultural world views shape an individual's perception of risk, and this individual perception is generally compounded when similar beliefs are shared with similar individuals. A dismissal of the legitimate threats of climate change, particularly on a national or international stage, will likely be supported by those who share broadly the same political views and can lead to ill-informed

decisions on the how to engage with climate action, if at all (Kahan et al., 2007). In the US, organised climate change denial, generally promoted by white conservative males who tend to hold positions of power, has been prevalent since the 1990's. It emerged at the same time that the notion of a risk society, and the recognition of climate change as a serious threat took hold. The political promotion of climate change denial during the Trump administration, from 2016 – 2021 again brought this denial to the forefront of debate and in many parts of the US and globally, climate change denial continues to significantly hinder the progress of meaningfully planning for, and addressing climate change.

Dealing with risk and the threat of climate change requires informed decision making that is often at the mercy of individual and collective misperception. Denial, or overoptimism, amongst other factors, serve to impede implementation efforts. Adams (2021) suggests that these barriers to climate action are part of a broader societal problem and "psychological understandings of, and responses to, climate change - from deep-seated denial to engaged activism - cannot be considered in isolation, but are embedded in interpersonal, community and wider cultural, social, political and material structures, all shot through with issues of power and resistance." (p.34)

An Uncertain Future

As discussed, past planning perspectives have often attempted to ensure that the future is foreseen and stable, through 'command and control' approaches to managing risk (Sharifi and Yamagata 2018). This ability to control urban environments in terms of the impacts of climate change began to waver in the 1990s, and as Friedmann commented, planning is shifting from "an instrument of control to one of innovation and action" (2003, p.8). As the notion of the risk society continued to take off in late 20th Century, and into the early 21st Century, it was increasingly clear that attempts to control risk, or climate change, or the environment, would not be fruitful and the "modern dream of equilibrium, stability, predictability and control" (Coaffee, 2019, p. 41) was unachievable in the face of an increasingly unstable and uncertain climatic future. A future that was experiencing an increased

magnitude and frequency of extreme events, both climatic and otherwise (Coaffee & Lee, 2016). In the early 2000s extreme weather events such as the 2004 Boxing Day Tsunami and Hurricane Katrina in 2005, further showcased that the world was in a perpetual state of human-exacerbated risk; a reality that required new approaches and new ways of thinking that were not short-term, inflexible or outdated.

Many conventional approaches to responding to risk in cities were more backwards looking, basing future action upon past occurrences. Risk management approaches, and other forms such as emergency management, civil protection or civil defence were also often too rigid in their approach and relied on a "narrow range of technically oriented stakeholders" (Coaffee & Lee, 2016, p.53; Schroeder, 2001; Quarantelli, 1995). With the focus of managing risk primarily centred on the national and international level throughout the 20th Century, city-scale (Schroeder, 2001).

The ability of planning to incorporate risk into its ways of working was further limited due to the type of climate change modelling used. As mentioned previously, the IPCC used scenario planning heavily in the 1990s to anticipate and prepare for potentialities. However, using predictions and looking to the past in an attempt to model the future led to a highly restrictive planning approach that, in an effort to maintain stability, did not take into account any unforeseen circumstances or volatilities. Though it could be argued that scenario planning encouraged a more forward-thinking approach, considering the varying uncertainties the future may hold, the 'predetermined outcomes' that scenario planning produces serve to limit future actions to prepare for perhaps incorrect or non-existent realities with the extrapolation of trends leading only to a single outcome, or Plan A (Coaffee, 2008; Stojanović et al. 2014).

As well as scenario planning, the usage of complexity theory in urban planning also aimed to anticipate uncertainty, model alternate futures, and ascertain the desired outcome to inform action (Bryne, 2003; Healey, 2007). Since the mid-20th Century, cities have been viewed as complex systems and as a synergetic set of interacting components or agents, as opposed to "an aggregate of inert architecture, [that] could be legitimately designed, controlled, prescribed" (Batter & Marshall, 2012, p.2;

Batty, 2008). Applying complexity theory to planning often also focussed on equilibrium and maintaining the status-quo, so that the system could maintain its functional capacity (Crawford, 2016). This use of scenarios and simulations to extrapolate trends leads to an inflexible approach to planning. This is particularly true when applied to climate change, as it is highly reliant on accurate predictions with little room for unexpected occurrences, again reinforcing that "the idea of the planned city as a knowable utopia is a chimera" (Batty & Marshall, 2012, p.44).

At the turn of the millennium, the modernist penchant for order and control when planning for shocks and stresses was increasingly identified as insufficient and ineffective in the face of risk. It was at the start of the 21st century that the policy discourse of urban resilience begun to emerge as a result of the anticipation of a future of growing climate risks and insecurities. As Davoudi further commented "within this narrative, unpredictability and uncertainty replace the (false) sense of certainty and the overrated human ingenuity" (2012, p.63). In short, resilience created room for planners and other urban stakeholders to take a more fluid, less reactive approach and to "adapt to changed circumstances, to change, rather than to continue doing the same thing" (Adger, 2010, p.1).

The Requirement and Rise of Resilience

The previous section explored some of the limitations and pitfalls of prior attempts to plan for and cope with risk which has led to a global requirement for new ways of dealing with risk, especially climatic risks, and subsequently to urban resilience as a new conceptual figurehead for addressing the impacts and threats of climate change, particularly in cities. Modernist ideals of control and confidence in planning for the future began to give way to resilience planning processes that offered integrated approaches that acknowledge the "indeterminacy, incommensurability, variance, diversity [and] complexity" of future risk (Allmendinger, 2008, p.28).

Rigidity and short sightedness were common aspects of planning efforts, particularly before the turn of the century. Although, as evidenced, the global recognition of climate change as a threat was growing rapidly, more nuanced ideas were yet to

emerge. Initial notions of climate mitigation and adaptation were formed, but new ways of thinking and approaching planning for climate change were required to morph these ideas into the more modern ideas of resilience as it is today, and to move beyond a reactive and static approach to tackling climate challenges (Chandler & Coaffee, 2016; Woods, 2003).

The emergence of a contemporary view of risk, that is uncertain and unpredictable has provided the scope for resilience to grow as a key mechanism of response; moving from static or short-term approaches to a permanent process of change, adaptation and transformation (Coaffee, 2019). Risk is not easily predicted or quantified and brings with it a sense of precarity that requires a flexible outlook. As technology has advanced and interconnectedness and communication abilities across the globe have increased, there are more resources, as well as more stakeholders and knowledge, available to pursue dynamic and updated approaches to dealing with climate change through practices of resilience. At the same time, this could also mean that there is more to lose, and therefore more urgency.

The resilience zeitgeist of the 21st Century, along with new understandings of risk, reflect the need to move on from regimented responses to shocks and stresses; there is a requirement to not only resist risks such as extreme weather events, but recover from them. In this sense, "an unknown future has significantly contributed to the rise of resilience as the policy metaphor of choice for coping with and managing future uncertainty (Coaffee, 2008, p.95). Therefore, rather than pre-meditated or restrictive approaches such as scenario planning, or concrete goals such as sustainability, resilience requires a state of constant adjustment in the face of unpredictability and the unknown (Martin-Moreau & Menascé, 2018).

The resilience boom is also partly due to the all-embracing nature of the phrase, allowing it to be used and interpreted by an array of urban stakeholders and foster collaboration and a dynamic approach to addressing climate change. That said, this flexible terminology has been criticised with White and O'Hare noting that "definitional precision is rare" and highlighting the potentiality that resilience "remains an intangible aspiration" (2014, p.11). As the requirement for resilience has

become more apparent, particularly in cities, and the threat of climate change continues to rise, a new set of challenges emerge regarding resilience. Nonetheless, it is clear that resilience will remain popular in the near future, taking the reins from concepts such as DRR and sustainability as the world continues to face growing uncertainties and unknowns.

As resilience has emerged into the lexicon of planning in the early 21st century and has continued to grow in popularity, it has had an increasing impact on planning agendas across the world by forcing a focus on flexibility, long-term action, and collaboration, effectively "breaking planning out of its obsession with order, certainty and stasis" (Porter & Davoudi, 2012, p.330) whilst the threat of climate change continues to rise. The following table, adapted from White & O'Hare (2014), shows a simplified version of the changing nature of planning as resilience takes hold as a planning concept, and forces planners to reassess the conventional and expected notions of what planning is:

	'Pre-resilience'	**Resilience**
Aim	Equilibrium	Adaptation
	Return to normality	New normal
	Stability	Change
	Bounce-back	Bounce-forward
	Mitigation	Transformation
Planning Approach	Short-term	Long-term
	Reactive	Flexible and proactive
	Techno-rational	Socio-cultural
	Recovery	Preparation
	Siloed	Integrated

Table 2. *The Changing Nature of Planning*

The nature of planning practice is being challenged by the rise and requirement of resilience; it can no longer focus on short-term options and maintaining equilibrium. Planning is moving from a traditionally conventional and controlling practice, reflected in the earlier discussion of historic approaches to risk and climate change, to a more collaborative, dynamic and future-looking enterprise, mirroring the

concept of resilience itself. There has been a turn to the process of planning, rather than fixed solutions, as resilience requires an ongoing series of malleable initiatives and actions, rather than being a 'one and done' milestone to achieve. From the more top-down, pre-defined, static version of responding to risk, resilience approaches encourage collaboration, knowledge generation and more of a focus on community (Rogers, 2016). A more detailed analysis of how the rise of resilience has impacted the practice of planning and led to the concepts of extreme-ing cities will be unpacked in the next chapter.

Chapter 3

Planning and Resilience: Extreme-ing

Resilience, beyond the urban connection, has a long etymological history. Whilst the term resilience comes from the Latin 'resiliere', roughly meaning, 'bounce back', there are evidently a plethora of differing definitions, interpretations and applications of the concept of resilience. In 1973, Holling utilised resilience within an ecological context, as a concept that explored how change or disturbance affected the state of ecological relationships. The term has also been linked to psychological and engineering fields, before emerging in the field of social science, where urban planners have sought to find resilience principles that could be applied to the planning process. Beyond this, resilience has grown from a more physical 'tool' to incorporate notions of governance and management in cities, considering social constructs that may have previously been overlooked (Lang, 2010; Walker et al., 2006). In relation to cities, the discourse of urban resilience that has emerged in recent years generally presents the understanding that, in the face of multiple risks and in particular extreme weather events, both immediate and ongoing, cities must be able to continue to function (van de Ven et al., 2016).

Resilience and planning, whilst a responsibility of the state level, is increasingly falling upon cities and their respective governments as a pressing and complex issue to overcome; planners are being called upon to enhance their approaches and practices in the face of climatic threats (Coaffee, 2013). Climate action at the city scale is being more noted; cities are important hubs and therefore city-level issues are gaining relevance and momentum on the worldwide policy stage. As Betsill & Bulkeley noted, "cities, rather than nation states, may be the most appropriate arena in which to pursue policies to address specific global environmental problems" (2006, p.143) (see also Hunt & Watkiss, 2011). Nonetheless, urban systems face limitations and there is a requirement for an in-depth understanding of the challenges they face as well as the systems themselves (Omojola et al. 2011). In particular, the definitions of resilience are multiple and complex and could serve to hinder its

progress as stakeholders clash over its interpretation and subsequent implementation approaches (Meerow et al. 2016).

In parallel, the nature of planning is changing as a result of the need to address climate risks. Once a vessel for experimental flagship projects and social engineering, climate change has put pressure on cities to mitigate, adapt to and address increasing threats. The changes cities are undergoing as a result of climate change strongly affects the practices of urban planners. Impacts of climate change are felt locally and often exacerbated in urban areas. Planners are now expected to do much more than regulate land use with multiple urgent urban agendas competing for their attention, and, with regard to climate change, it is at "finer spatial scales that more comprehensive design and implementation of adaptation strategies, plans and actions is beginning to take hold, often in the absence of a strong national lead" (Carter et al, 2015, p.5). Due to the political nature of both planning and climate change, planners are increasingly having to cope with being in states of flux depending on the political climate, whilst addressing climate change with less support and fewer resources, becoming increasingly reliant upon "voluntary action backed by political will" (ibid, p.8).

The 21st Century has seen vast changes in what is expected from planners and planning practice; the pressures of climate change and the rise of resilience as other approaches have become outmoded or insufficient, have given a new dimension to the remit of planners as the profession continues its paradigm shift towards different forms of climate action. Here shorter-term reactionary 'pre-resilience' planning practices are transitioning towards more flexible, long-term, socio-cultural approaches under the banner of resilience (White and O'Hare, 2014).

In this chapter, urban resilience is explored in detail, including the nebulous nature of its definition and the development of resilience-specific organisations. The question 'what is a resilient city?' is posed and addressed, before an in-depth look into planning for resilience, covering the changing nature of planning, the capacity of planners to incorporate resilience into their practice and the challenges that planners encounter when working alongside other urban stakeholders within the

resilience building process. First, the concept of extreme-ing cities is explored in relation to the rise of resilience.

Extreme-ing Cities

The emergence of urban resilience as a globally used policy term is intrinsically linked to cities' increasing vulnerabilities to climate change. Environments and cities not traditionally considered extreme are becoming increasingly extreme in nature hence, 'extreme-ing'. In extreme-ing cities, shocks and stresses are harder to anticipate, former desirable locations are becoming sites of vulnerability and planners must face the unknown, where the built environment is exacerbating growing climatic threats: "cities are increasingly feeling the effects of extreme weather" (Bai et al., 2018, p.23). Historic, strategic and advantageous locations for cities, such as a close proximity to rivers and oceans for transportation and trade, have now become their 'Achilles-heel' (Ali, 2016).

Notably, extreme weather events present an immediate and initially devastating threat to cities (Hunt & Watkiss, 2011). Between 1989 and 2018, there were on average 520 extreme weather events per year, in the 2009-2019 period this grew to 660 per year (Natural Catastrophe Service, 2020). Here, the notion of extreme-ing can be linked to the ideas presented in Chapter 2 about an increasingly volatile and unpredictable future of risks, where extreme-ing cities are trying to get ahead of the curve by adopting ongoing and long-term resilient thinking, rather than attempting short term fixes. As the extreme-ing nature of cities evolves, resilience thus becomes a transformative tool for futureproofing.

There are many implications of both the long-term impacts of climate change as well as the immediate extreme shocks faced by cities that are unique to their urban configurations (Hunt & Watkiss, 2011). Extreme weather has always been experienced however because the impacts are now being magnified by climate change, it is forcing urban stakeholders to confront it in a new way, through resilience. In the 2007 IPCC report, it is stated that:

> "Where extreme weather events become more intense and/or more frequent, the economic and social costs of those events will increase, and these increases will be substantial in the areas most directly affected. Climate change impacts spread from directly impacted areas and sectors to other areas and sectors through extensive and complex linkages" (p.37).

The vulnerability of cities differs depending on location and can be more socially based, or physically, amongst other conditions. A warming climate may have significant implications for the health of urban populations, such as wildfires, and the urban heat island effect (increased thermal storage capacity), which is a prominent cause of urban population mortality in the USA. This is exacerbated by population movement into urban areas (Luber & McGeehin, 2008). There is also a variation regarding how well-equipped cities are at responding to these vulnerabilities (Borden et al., 2007).

There are suggestions that vulnerability is decided not only by external, climatic factors that can only be influenced to a certain extent, but also human decisions, including those made by planners. Wamsler acknowledges that human choice can make urban areas even more vulnerable, noting that "in the end, whether you are vulnerable to disasters or not depends mainly on where you live, and in what type of house you live in. These are the key factors if you are a victim or not" (2004, p.14). As such, socio-economic factors become equally important considerations when addressing climate change impacts, affecting how they manifest themselves upon impact in urban areas (Bosher, 2008).

Impacts of extreme events can be exacerbated in a number of ways dependent on different urban factors both physical as well as socio-economic. For example, the configuration and adeptness of the municipal government, i.e. institutional weakness, can severely impact upon the damage caused and the subsequent response (Hunt & Watkiss, 2011). Furthermore, hazards and extreme weather events affect the areas surrounding cities; whilst the main impacts may be in the urban core, satellite effects may impact infrastructure such as transportation (Borden et al., 2007). Climate change can therefore be seen as a 'multiplier'; amplifying existing urban threats

within and pushing the capacity of the built environment to withstand shocks and stresses to its' limits (Kalliojärvi, 2020). The form of the built environment can exacerbate extreme weather events, or at least, provide no help in minimising the varying impacts (Bosher, 2008; McBean & Ajibade, 2009). According to the C40 Cities' (Climate Leadership Group) website, "cities are as powerful as they are vulnerable" and more innovation and action are required to address this. One could even view extreme events as an opportunity, there is a "potential for extreme weather events to open windows for public policy changes or transitions" (Friedman et al. 2019).

In contrast to the 'extreme' examples presented in Chapter 2, where cities were developed in already established extreme environments, the following examples focus on 'extreme-ing' cities, where in more recent years, extreme weather events have devastated the urban areas and highlighted the need for more resilience planning. These US examples show the impact of extreme weather on cities, that have been exacerbated by the urban form and arguably, inadequate or misplaced urban planning practice.

2005's Hurricane Katrina acted as a signal that cities are not inherently adaptable, and research and action were required on a smaller, city-level scale, including urban planning. In August of that year, over 80% of New Orleans was flooded as a result of Katrina. The city and surrounding Gulf Coast area suffered catastrophic damage and loss of life, worsened by being in an already disadvantaged state prior to the event occurring. A federal government policy named 'safe development' prioritised profitability, and vulnerable areas such as levees were developed upon despite the risk (Campanella, 2006). The immediate post-disaster response exacerbated the situation; lack of coordination between government tiers hindered emergency response and an oversight of local knowledge as a resource impacted upon evacuation efforts and temporary housing usage. Car-reliant evacuation routes were prioritised, highlighting a disconnect and misunderstanding between communities and government as well as other responders; due to the low-income communities that were particularly affected, car ownership was low (Ascott & Kenny, 2019). Furthermore, severe overcrowding of temporary shelters and a depletion of supplies

were worsened by an underestimation of the homeless population numbers (Townsend, 2006).

The longer-term recovery process after Hurricane Katrina in New Orleans was complex and gradual; communication barriers and a general 'laissez faire' approach to planning and planners contributed to the "institutional inertia" (Coaffee & Clarke, 2015, p.253) that has cemented Katrina as a lynchpin for 'what not to do' (Campanella, 2006).

As briefly mentioned in Chapter 1, apathy also contributed to the devastation and inadequate response in Houston after Hurricane Harvey. Here, negligence in the form of urban development being prioritised over vulnerability lead to catastrophe and resilience was compromised by planners and other city stakeholders (Ascott & Kenny, 2019). The fear that was sparked by Hurricane Katrina provided the US government with an opportunity to ensure that all local governments established disaster plans. The aftermath and response to Hurricane Katrina could have been more efficient with a more streamlined and cooperative response. With more consideration to restraining development in disaster prone areas and a more unified, integrated and localised approach to disaster response, the recovery process could have been faster and more efficient.

Miami can also be used as an example of an extreme-ing US city, highlighting how a desirable coastal location has become its biggest threat. A lack of political fortitude alongside fiscal limitations placed upon planners to address sea-level rise and build resilience has resulted in the city being desperately at risk of climate change shocks and stresses; dubbed 'ground zero' in the climate crisis (Atzori & Fyall, 2018; Coaffee & Lee, 2016). On the front line of climate change, Miami and the state of Florida are at risk of major sea level rise, increasing coastal storms, hurricanes and severe coastal flooding. Miami is known for its proliferation of high-end real estate, art deco architecture and enviable beach-front location, present against the backdrop of a low-lying coastal location. Wakefield describes resiliency planning approaches in Miami as 'experimental', describing the city as a 'living laboratory', utilising large scale projects in an effort to stem climatic concerns. This approach is criticised, described by the author as 'back loop urbanism' that attempts to maintain the

identity of a system during a crisis as "a mode of governing that works through experimentation to ensure the continuation of a homogenous social and economic order seen as beneficial for some" (p.42, 2019).

Another, well-known example of climate action planning in the US, is referred to as 'The Big U' or 'The Dry Line'. This project is a 10-mile 'protective ribbon' intended to wrap around the bottom portion of Lower Manhattan in New York City, protecting arguably some of the most valuable real estate in the world. New York is noted to be at the forefront of climate action and resilience planning, with 'The Big U' acting as quasi flagship for large-scale urban climate planning projects across the world. Hurricane Sandy, which struck New York in October 2012 cost the US just over $70 billion in damage, with the most catastrophic impacts in downtown New York itself. As part of the response in the wake of Sandy, within the 'Rebuild by Design' approach, 'The Big U' was proposed, to act as a buffer and to also combine social benefits with protection, challenging the idea that flood infrastructure must be detrimental to the enjoyment of a city's waterfront (Coaffee, 2019). Some remain sceptical of The Big U; the project has yet to break ground and has been accused of encouraging more gentrification in the area, with the promise of a more resilient Lower Manhattan that protects the interests of the wealthy, instead of prioritising the city-wide resilience requirement (Crowe et al. 2016).

These US examples link to the case study focus of this project and elucidate the wide range of applications and potential misuses of urban planning as a means to build resilience and promote climate action in cities. More broadly, varying approaches across the world have begun to interpret, define and mobilise the intricate concept of urban resilience in a plethora of manners, which could potentially lead to a maladaptive form of planning that "confuses and impedes progress in climate change adaptation" (Fisichelli et al., 2015, p.755).

Global Resilience

Whilst resilience has existed in various, more theoretical formats in fields such as ecology, economics and psychology, only more recently has it been linked to urban

development the profession of urban planning (Coaffee, 2013). The rise of urban resilience as a global concept has triggered many debates surrounding the use and practices of resilience, out of this a range of organisations and city-based initiatives have adopted ideas of resilience or been created with a focus on climate resilience. International organisations such as the UN have also played an key part in progressing the resilience agenda and prioritsing climate action at the global scale.

2015 was a particularly important year for international resilience, with the simultaneous adoption of the UN SDG's, the Sendai Framework for Disaster Risk Reduction as well as the Paris Climate Conference COP21 and the subsequent Paris Agreement. This "created a rare but significant opportunity to build coherence across different but overlapping policy areas" and helped "make for a more complete resilience agenda…spanning development, humanitarian, climate and disaster risk reduction areas" (Murray et al. 2017, p.1). There was also more of a focus on the city-scale; this can be particularly exemplified by SDG Goal 11, 'Sustainable Cities and Communities' which is devoted to urban areas and prioritised resilience, safety and inclusivity; themes that run throughout many cities' resilience strategies or climate action plans (UN, 2015). The United Nation Climate Change Conference COP25 in 2019 further prioritised UN Sustainable Development Goal 11; identifying resilience, adaptation and local knowledge as key tools to address climate change, particularly in urban areas, similar to COP24 in 2018.

Beyond this, climate change resilience agendas have manifested themselves across the world stage. Major international organisations such as the United Nations, the World Bank, the International Monetary Fund (IMF) and the European Union (EU), as well as aforementioned initiatives such as the Sendai Framework and the New Urban Agenda are all pushing resilience as a policy priority. Furthermore, particular city-focussed organisations have been created with a specific prioritisation of resilience or related topics (Chandler and Coaffee, 2016). For example, The C40 Cities Climate Leadership Group was founded in 2005 and the Urban Climate Change Research Network (UCCRN) was formed in 2007.

An especially well-known example of the organisations embracing the resilience agenda was the 100 Resilient Cities initiative from the Rockefeller Foundation, that was disbanded in July 2019. Launched in 2013, it was formed to create a network of cities from around the world with the hopes of enhancing resilience through providing knowledge and support, as well as financial and logistical guidance. Each member city (including the case study of Boston) was aided with the establishment of a new city government position, 'Chief Resilience Officer'. The Rockefeller Foundation also supported the cities in producing 'resilience strategies' (Zebrowski, 2020).

More recently, the United Nations Office for Disaster Risk Reduction (UNDRR), launched the Making Cities Resilient 2030 campaign in October 2020, which is aimed at creating networks of partners to connect cities who are committed to building resilience. The campaign will begin operations in January 2021 with the aim of creating a resilience roadmap for cities (Malhotra et al. 2020).

In addition, in the US the Federal Emergency Management Agency (FEMA) has dubbed, 'hazard mitigation' as a 'cornerstone' of their approach to dealing with shocks and stresses. In addition to specific organisations, countless reports have been produced focussing on climate change, in relation to resilience and cities. Notably another US-centric document, *Disaster Resilience: A National Imperative*, published by the US National Academies, also focussed on building resilience across the country in a pre-emptive response to the growing frequency and devastating impacts of natural hazards, the impacts of which, in many cases of were being exacerbated by climate change (Cutter et al, 2013; Coaffee, 2019).

Wamsler argues that international initiatives that focus on disasters, hazards and climate change are too "sector specific" and exclude planning as a consideration (2008, p.74). Furthermore, the spectrum of phrases is broad, ranging from 'extreme events', to 'hazard mitigation' and 'sustainable cities', thus showing the difficulty in streamlining an approach, and highlighting the ambiguity of resilience related lexicon. The ambiguousness of resilience and its flexible definition, which is

explored later in the chapter in relation to planning, leads to the question, what is a resilient city? This is explored in the next section.

What is a Resilient City?

There is no concrete definition, or strict set of rules that sets out what exactly a resilient city is, as the notion of resilience is so flexible and context dependent. According to Rockefeller 100 Resilient Cities, a city that is resilient includes its ability to not only cope with physical shocks such as floods, earthquakes or outbreaks of disease, but also societal stresses that can jeopardise the fabric of daily city life, such as inequality or institutionalised racism. The Rockefeller Foundation focusses on the principles of a resilient city, by identifying four essential city systems: leadership & strategy, health & wellbeing, economy & society and infrastructure & environment. Within these systems, resilience drivers are suggested to show the approaches cities can take to build resilience, such as 'fostering long-term and integrated planning', or 'promoting cohesive and engaged communities' (Rockefeller Foundation, 2018). The former president of the Rockefeller Foundation, Judith Rodin, highlighted the need to recognise that there is no one version of a 'resilient city': "your city's vulnerability to water may require an 8ft-tall dyke, while another city requires natural infrastructure like archipelagos and oyster beds. Those are very different practices, but they represent the same resilient principle" (Watson, 2014, p.98).

As each city possesses a unique set of challenges and characteristics, a homogenous approach to resilience is therefore generally unsuitable. The interpretability of resilience is a benefit here as it allows each city to tailor its resilience approach, whilst maintaining the essence of the concept. Godschalk comments that cities that embody resilience, must be flexible rather than fragile, and as complex networks, all facets of their functioning must continue to serve and support the cities infrastructure and residents. Whether cities face threats in the form of environmental change, or extreme hazards, or security threats, the goal of resilience remains the same. The 'resilient city', according to Godschalk (2003) adequately prepares buildings to stand up to threats and conservation measures are implemented to ensure natural barriers

are maintained and useful. Additionally, all government levels as well as private sector stakeholders and residents are comprehensively informed and equipped to cooperate and communicate.

In 1997, Harold Foster set out a list of resilience principles, suggesting the qualities that resilient 'systems' should possess in order to remain resilient. Whilst this pre-21st century idea does not specifically address urban areas; it still remains pertinent when applied to cities. Godschalk and others interpreted the principles, and the following list identifies the qualities that resilient cities tend to possess. Resilient cities are:

- "Redundant—with a number of functionally similar components so that the entire system does not fail when one component fails.
- Diverse—with a number of functionally different components in order to protect the system against various threats.
- Efficient—with a positive ratio of energy supplied to energy delivered by a dynamic system.
- Autonomous—with the capability to operate independently of outside control.
- Strong—with the power to resist attack or other outside force.
- Interdependent—with system components connected so that they support each other.
- Adaptable—with the capacity to learn from experience and the flexibility to change.
- Collaborative—with multiple opportunities and incentives for broad stakeholder participation."

(2003, p.139)

More recently, De Brujin et al. suggested 5 principals for resilience to enhance the capacity of cities to cope with extreme weather:

1. "Adopt a system's approach

2. Look at beyond-design approaches
3. Build and prepare infrastructure according to 'remain functioning' principal
4. Increase recovery capacity by looking at social and financial capacity
5. Remain resilient into the future"

(2017, p.24)

These principals can be used to build a basis for an overarching understanding of a 'climate resilient city'. Nonetheless, it remains difficult to strictly define a resilient city. Satterthwaite and Dodman suggest that "a resilient city is one in which city authorities are genuinely responsive to the priorities and needs of all residents" (2013, p.291). This however is heavily reliant on the commitment and competency of the authority in question, which greatly impacts the capacity for a city to pursue a meaningful resilience agenda.

Mileti builds upon the idea of capacity by suggesting that a resilient city is one that is self-sufficient; "resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life and without a large amount of assistance from outside the community" (1999, p.32–33). Here, capacity goes further than the governing authority to include other stakeholders such as community members.

One can go beyond the definition of a resilient city, to then ask who or what is the intended target of resilience. When planning for resilience, it is not always clearly defined for whom the resilience is required. Existential questions emerge, surrounding the intentions of resiliency; "who gets the right to the resilient city? Only those who can afford and finance it?" (DuPuis & Greenberg, 2019, p.12). As well as urban planning, politics and power must also be considered when 'allocating' resilience. Shaw & Sharma (2011) suggest that in communities, self-reliance may be advocated to absolve authorities of responsibility, leaving communities to fend for themselves. Furthermore, the desired outcome for one stakeholder, may differ to other stakeholders, leading to an imbalance and issues of justice (Serre and Heinzelf, 2018). In addition, whilst resilience is the crucial goal, it is not always explained to what end the goal can be achieved, i.e., resilience to what end? It is argued that

resilience should be a dynamic process that must move along with the complexity and dynamism of cities, and therefore shouldn't be an end goal but a continuing process that mirrors the changing issues and challenges that cities face. It is highly unlikely that there will come a day where a city solves all of its problems and no longer requires resilience (Davoudi, 2016).

It could be suggested that we are beyond questioning and discussing the concept of resilience itself; many cities across the globe have already begun comprehensively incorporating resilience in a variety of different formats into their overall discourse, therefore the discussion of its meaning could be seen as futile and it would be more efficient to question how they are enacting resilience. Cities are producing documents such as 'resilience strategies' and the concept has clearly taken off. It is posited that the logical progression of analysis is to move from analysing the idea of resilience to analysing the application and adoption of resilience, in this case particularly in urban areas (Béné et al. 2017). There then arise further questions regarding whom exactly should be trusted and held accountable for, 'overseeing' the resilience agenda and climate action in cities. Dalby asks, "who gets to decide what kind of life will be lived in what biospheric conditions?" (2013, p.184).

To build on this even further, the motivations behind resilience enactment can also begin to be explored. Climate change has triggered the need for innovation and the development of new measures that planners must use to incorporate resilience ideas into their practices, to become more proactive and forward-thinking (Füssel, 2007; Coaffee, 2013). However, whilst it is clear that climate change and extreme weather events present considerable challenges for cities and urban planners, the motivation behind resilience incorporation may be different, and could go some way to explaining the variety of challenges planners are facing along their 'resilience journeys'. More needs to be known about the sources of motivation, from internal requirements to external pressures. Wider policy could be playing a part in influencing planners, or it could be their own intuition that is driving resilience forward. Furthermore, the need for resilience mainstreaming and increased levels of communication and collaboration across resilience stakeholders could be being hindered or helped by these expectations and the requirements being put upon planners (Carmin et al., 2012). Building upon the idea of motivation behind

resilience; priorities may be impacted by factors including time constraints and financial availability. Less tangible factors should also be considered such as people's sense of ownership in urban areas, or the underlying priorities of differing stakeholders (Wamsler, 2004).

Defining Urban Resilience for Planners

It is clear that "the rhetoric of resilience has now permeated a range of disparate disciplinary areas" (Coaffee & Fussey, 2015, p.87), and has taken on different meanings and different intentions. Planners and other built environment professionals are engaging with resilience thinking on a much larger and perhaps more tangible scale, although Biermann et al. (2016) remind planners that critical thinking surrounding resilience must also be contended with and incorporated into initiatives; factors such as power and justness can influence resilience, ensuring it is not an isolated rhetoric. The concept of just resilience planning is built upon by van den Berg and Keenan, who suggest that in the realm of resilience, planners must look beyond immediate vulnerability and focus on the bigger picture; "In order to maximize the procedural justness of adaptation planning for the benefit of vulnerable populations one must; (i) develop a capacity to frame and measure vulnerability in dynamic and not stationary terms; and (ii) acknowledge, engage and provide representation to vulnerable populations, as those populations shift and change over time." (2019, p.91). Furthermore, Coaffee (2013) notes that urban resilience spans beyond the planning realm and requires a "mutual accountable network" of stakeholders to be successful (p.3).

Resilience is arguably the latest 'buzzword' in urban planning lexicon; it has particularly taken purchase as a response to climate change. However, the concept of urban resilience lacks clarification when being defined; it is a diverse and flexible word and, as Meerow et al. put it, has a certain "conceptual fuzziness" (2016, p. 39) surrounding it. This fuzziness can be both beneficial as well as causing hindrances such as misinterpretation and a vague quality which may be too difficult to apply in policy and practice. The ambiguity of defining resilience must successfully leave the realm of research and be translated into practical and applicable principals, policies and strategies that consider whole urban systems and aim for long-term resilience

(De Brujin et al. 2017). As a counter to the criticisms of ambiguity, Shamsuddin (2020) notes that the flexibility of the word resilience may in-fact have contributed to in enduring appeal as a buzzword; people can find their own meaning in the concept, and interpret and implement resilience in their own way. Resilience, whilst having many definitions, does not have many rules, which could, for example, lead to different stakeholders interpreting and applying the concept differently, potentially to their own benefit over broader resilience goals. The flexibility of the word can be viewed as positive or negative depending on the impacts and benefits of its intended use.

Resilience has long been an ecological concept; only recently have more social concepts been introduced and integrated to an extent; including issues ranging from urban governance to community participation and social justice (Béné et al. 2017). However, Davoudi (2014) argues that resilience has been reduced to an emergency concept, sometimes interpreted as a 'panacea' solution for cities (Shaw & Sharma, 2011). In planning scholarship, the concept of evolutionary challenges this by presenting a paradigm shift in resilience discourse, suggesting the focus should be on adaptation and transformation, and that traditional approaches to planning are insufficient:

> "[Evolutionary resilience] challenges the adequacy of planners' conventional "toolkits" such as extrapolation of past trends in forecasting for reducing uncertainties. Does this mean that in a world defined by constant change and uncertainty "planning is condemned to solve yesterday's problems?" (Davoudi, 2014, p.303).

Evolutionary resilience views urban areas as connected and complex and most importantly, unpredictable. It is suggested that by reframing planning from an evolutionary resilience perspective, an agenda that is more progressive and transformative can potentially emerge, challenging traditional expectations and decision-making processes (Shaw & Sharma, 2011). More recently, several resilience ideas have emerged in literature, such as the idea of 'bouncing forth' (Davoudi, 2012; Manyena et al. 2011) 'bouncing back in better shape' (Wardekker

et al., 2010), ‘build back better’, ‘muddle through’, ‘bouncing forward’, ‘adaptive cycles’ and even ‘just a metaphor’ (Berkes and Ross, 2016; Pendall et al. 2010; Atallah, 2016).

To extend upon the idea of ‘bounce-back-ability’, a large proportion of existing literature on urban resilience focuses on larger-scale disasters and one-off ‘shock’ events, focussing less on issues and challenges that develop slowly over time, in conjunction with extreme events. Sea level rise is a good example, whilst coastal storms and storm surges, and other one-off impacts such as tsunamis, can have devastating and immediate effects on urban coastal areas, the slower threat of sea level rise may have equally devastating effects, that are less noticeable or impactful on a day-to-day basis, but over time will also require comparable attention and planning. These ‘slow burn’ impacts are accumulated over time and can have just as disastrous impacts, requiring planners to contemplate long-term threats that could be years in the making. Using adaptation pathways to address these unknowns is a resilience related planning tool that explores and analyses a range of possible futures, and the options within each. It could be seen as an advanced form of scenario planning that allows for uncertainty and flexibility (Zandvoort et al. 2017; Coaffee, 2019). The options for ‘bouncing back’ in the face of these slow burn events is limited, requiring instead a future-looking process of evolving and adapting.

Returning to normal after disasters is often a top priority in terms of resilience, however as the discourse progresses, questions regarding if a return to normality is desirable are emerging. If such disastrous effects can happen in the current state, is it sensible to attempt to return to that state rather than being flexible and adaptable (Davoudi, 2014). Another criticism of the ‘bounce-back’ mentality suggests that a focus on this overlooks an alignment with other, changing and updated urban polices, which can serve to create a disconnect between stakeholders, where, particularly in times of disaster, a sustained, coordinated approach to resilience is required (Sanchez et al. 2018).

Porter and Davoudi comment on the question of returning to normality, and the benefits and options that occur when the need for normality is removed:

> "The comfort with which resilience thinking eschews any particular state to be "normal" is also potentially very liberating. If, after a disturbance or upheaval of some kind, a system transforms into something different, then this is not seen as a failure in resilience terms, but as an inherent possibility within that system. Under these assumptions, we would, for example, be better armed if we cease talking about returning to a "normal" housing market or a "normal" economy, and instead focus on the possibilities for transformation and change to a potentially better housing market or more just distribution of economic resource" (2012, p.30).

This shunning of the concept of returning to normality saves the 'bounce-back' version of urban resilience from falling into an endless Escher-esque trap of resilience-disaster-resilience ad nauseum. The many definitional options for resilience provide positives in its malleability, allowing it to be tailored to certain situations, however it also means that for planners, interpreting and implementing the 'correct' version of resilience for their particular context is tricky, and leads to issues such as clashing priorities with other stakeholders or insufficient knowledge in certain areas.

In this chapter so far, the concept of urban resilience and its rise as a response to the threat of climate change In cities, as well as what came before resilience, haVE been explored. The following section delves, in more detail, into the role of urban planning within the growing resilience agenda, as a tool to contribute to cities' abilities to cope with climate change and incorporate resilience thinking and climate action into their remit.

Urban Planning Within the Wider Urban Resilience Agenda

As large-scale disasters have become more frequent in cities in the 21st century, with devastating urban impacts, they have served to trigger climate and resilience action and a more specific focus on cities and urban environment. Early 21st Century events such as the Kyoto Protocol in 2005 and the creation of the World Mayors Council on Climate Change (WMCCC), as well as others discussed earlier in the chapter,

showed that, potentially in contrast to the national level, city level leadership was becoming more open to focussing on protection and action (Rosenzweig, 2010).

As well as global policy changes, certain events, both natural and anthropogenic, also sparked action. As discussed previously, Hurricane Katrina marked the turning point for many US cities, highlighting the lack of preparedness in urban centres in the face of extreme weather and climate change threats. Other triggers include the major terrorist attacks of 2001 in New York (& Virginia), as well as Hurricane Sandy in 2012 (Borden et al., 2007). These threats highlighted the infrastructural and institutional weaknesses and ill-preparedness of cities in response to climatic shocks and stresses (Coaffee, 2013). Overall, there is not one singular reason behind the shift towards resilience and climate change action; cities have different reasons or 'trigger points' which may encourage policy discourse to change or action to occur, although generally the triggers are influenced by evolving social and political landscapes, as well as economic changes, AND the undermining of cities coping mechanisms by various threats (Carmin et al., 2012).

The Changing Nature of Urban Planning

Meerow and Woodruff suggest that planning is now "embedded within the broader resilience agenda" (2020, p.2). Resilience has certainly become a dominant narrative in urban planning and policy discourse and as such, cities are acknowledging the role urban planning can play within the resilience building process in response to the growing threat of climate change: "in the context of urbanization and urban policies, where scientific expertise plays a major role in framing policy debates, it can be argued that any narrative which becomes dominant in policy discussions will be instrumental in shaping the way future urbanization and urban planning will be conceived and implemented." (Béné et al. 2017, p.2). Pitidis et al. further call for "a new direction in strategic planning and design in order to deal with this new urban reality" (2018, p.1). How planning and climate change issues interact is an ongoing challenge for urban planning professionals. Füssel argues that it "means the use of information about present and future climate change to review the sustainability of current and planned practices, policies and infrastructure" (2007). Linking to the 'antiquated' view of planning already discussed, the practice is having to shift from

being a linear process to staying adaptable; in terms of disaster response after an extreme weather event or 'shock', there needs to be a balance between following 'protocol' and remaining flexible; with an ad-hoc attitude to managing the specific situation that is peculiar to the local area. Planning practice has been accused of being 'maladaptive'; an unwavering process based on tradition, policy immobility and reputational constraints (Masnavi et al. 2019).

There is a requirement for planning practice to change from the inflexible and reactive approach that it has historically taken, to a future-looking, transformative process. As highlighted in Table 2 in Chapter 2, to incorporate resilience thinking into their practice, planners must be more flexible and proactive, and use a more integrated approach that takes into account the socio-cultural factors of risk and resilience (White & O'Hare, 2014).

With this, also comes the requirement for planners to work with a range of urban stakeholders in the broader urban resilience agenda, where differing interpretations and priorities may clash. By combining the "different contextual manifestations" (Ascott & Kenny, 2019, p.6) of resilience, the minutiae of institutional concerns can be replaced by a holistic planning perspective (Ahern 2013). As Jabareen commented; "integrating the many different stakeholders and agents into the planning process is essential" (2013, p.224), as such the planning norm should alter and become more adaptive and practicable across a range of professional and public arenas. A mindset of stakeholder symbiosis is required not only by planners but all actors on the urban resilience stage to ensure an integrative 'journey' towards successful urban resilience (Coaffee & Lee, 2016).

Urban planning practice should be able to absorb resilience strategies into day-to-day routines; "planning has a long history of absorbing new concepts and translating them into its theories and practices" (Porter & Davoudi, 2012, p. 329). However, resilience can challenge fundamental and traditional understandings of urban planning and "the focus on resilience as a radical concept clearly challenges planning's linear assumptions" (Davoudi et al., 2012, p.311).

Due to the relative 'newness' of resilience as an urban planning concept, planning professionals lack knowledge and guidance when approaching the combination of measures required during the design and implementation phases of resilience planning. The increased requirement for collaboration with other urban stakeholders and engagement with climate science, means that there is a need for more training and knowledge that is often lacking in a planner's remit. Whilst planners can often be heavily involved in the resilience planning process during the initial phases, more could be done for subsequent phases. Questions surrounding the optimal ways to support planners, stakeholders and decision-makers have arisen and still require empirical research to understand what is helpful and what is lacking (Van de Ven et al., 2016). It is suggested here that a shift in urban governance is also required; to enhance their capacities to undertake the process of pursuing resilience, an integrative approach must be taken (Jabareen, 2013). In sum, for planners, "applying the resilience principles may turn a risk management strategy consisting of solely structural, protection-type interventions to a comprehensive strategy with additional preparedness and emergency response measures, spatial planning" (De Bruijn et al. 2017, p.28).

Planning Capacity

So far, it is understood that planning is undergoing a fundamental paradigm shift to incorporate resilience into the planning toolbox. It can therefore be understood that a lot of responsibility is being placed upon planners across the world to incorporate and prioritise resilience within their working practice. The questions of whether planners have the capabilities and capacity to do this has been less considered and will be explored in the rest of Chapter 3 and throughout the empirical and discussion chapters.

To explore the capacity of planners and planning tools to contribute to the urban resilience building process in cities, planning as a profession must be more deeply understood. Planning approaches vary from country to country however the essence remains analogous. Urban planning is the "intentional and explicit intervention in the built environment through the development of plans, programs and design" (Bush &

Doyon, 2019, p.4); planning practice balances a range of urban issues and the desire for urban development, with attempting to maintain a high quality of life for city dwellers, in a continuous and complex process. Incorporating resilience into planning adds to the pressure upon planners addressing a multiplicity of challenges in cities (ibid.). Planners cannot solve all urban problems, as such the capacity for planners to feasibly add resilience planning to their job description must be explored. In 2004, Wamsler investigated the complex interplay that occurs between risks and disaster and planning intervention. A multiplicity of factors, not limited to population growth and urban sprawl, informal settlements, physical hazard mitigation such as sea defences, air pollution and building regulations can be influenced by both urban planners and climate change in cities. The capacity required for planners, in order for them to manoeuvre through this complexity within the urban realm, and successfully implement resilience measures is vast and the challenges, whilst not insurmountable, are intimidating.

City level governments in the US and particularly other Western nations, possess power and influence over a range of factors and urban governance bodies; if inclined to do so, for example, city governments can prioritise climate change mitigation efforts such as greenhouse gas emissions (Betsill & Bulkeley, 2006). Urban planning departments generally fall under the remit of city governments; however, their skills may sometimes be underutilised within the urban resilience journey that many cities are undertaking. Planners oversee urban dispositions, and within cities could be considered 'boundary spanners'; their understanding of a breadth of urban issues often positions them at the core of discourse and action relating to urban resilience (Birch & Carney, 2019). Furthermore, planners can contribute to cities' capacities as a whole to build strong networks and bridge gaps between policy discourses and 'on the ground' action that needs to be taken. Whilst planning can shape how cities incorporate resilience, a strong urban governance system is equally required to ensure the appropriate planning practices are enforced (Romero-Lankao et al. 2016). Unsuitable planning methods can hinder progress, even more so when funds are limited and resources critical (Dodman & Satterthwaite, 2008).

Urban planners, depending on their training and specific job roles, possess a range of skills, expertise and initiatives that can be of use within the wider resilience agenda in cities. Particular skills and initiatives may include:

- Land use planning/zoning
- DRR experience
- Geographic Information Systems (GIS) & (Disaster/Threat) Mapping
- (Urban) risk assessments
- Stakeholder co-ordination
- Temporary & long-term settlement planning
- Land (and floodplain) management
- Blue-green infrastructure
- Social infrastructure building
- Master planning
- Data collection
- Prediction and modelling
- Plan implementation and modelling
- Cost-benefit analyses

Planners can utilise different tools and skills in the pursuit of resilience. They work with decision makers and stakeholders across the urban realm, in an effort to enhance their own capacity, as well as the physical and social capacity of cities to build resilience and seek climate action. Resilience is requiring planners to more comprehensively address the relationship between the ecological and sociological processes occurring in cities, as such, more nature-based solutions are being utilised, with emphases on the use of green space. This shift exemplifies a move beyond the anthropogenic outlook planners have historically had, to incorporate more forward look, fluid planning interventions, balancing nature with urban citizens and development (Bush & Doyon, 2019; Davoudi & Strange, 2008). Land-use planning can be used to control development in hazard-prone areas. Furthermore, planning can be used to ensure suitable routes for emergency response and evacuation, as well as encouraging hazard-resistant construction. Risk-based land-use planning is generally future-focussed; retroactive resilience planning is more difficult (Jha et al., 2013). These forms of resilience planning take time to be incorporated into policy,

requiring coordination between stakeholders and urban areas or jurisdictions. Meng et al (2020) note that "planning research and planning practice struggle to turn policy ambitions (within resilience and adaptation discourse) into concrete implementation" (p.20), thus, newer forms of resilience planning, such as the 'risk-based' approach, take a long time to fall into mainstream planning practice.

Community engagement is also becoming an increasingly crucial part of resilience and is a tool that planners are already used to using, having "dominated urban planning discourse" since the 1980s (Bush & Doyon, 2019, p.4). Urban resilience as a flexible and inclusive concept places high importance on community engagement. The involvement of communities within the wider resilience planning process can be used for many purposes, including as a way of addressing inequalities and informing decision making through local knowledge and experience (Innes & Booher, 2018). According to Birch & Carney (2019, p.314), "co-ordinated community planning + design may hold the greatest long-term risk reduction potential against the impacts of climate change but are generally underutilized". Planners possess a number of consultative tools. Citizen engagement is encouraged amongst planners, after all, their work generally impacts significantly on the residents that fall within their remit. Whilst engagement may not always be utilised to its full capacity, it is increasingly being viewed as a key part of the successful pursuit of resilience. As Karaan et al. (2016) note:

> "In the case of local planners, they can aid in localizing responses (consider existing structures, plans, community needs, etc.), while international urban planners can aid in capacity-building and providing expertise where there are none." (p.25).

Regardless of the skills or tools planners are utilising, such as citizen engagement, "the success of planning measures relies on how they are delivered" (Meng et al. 2020, p.1). Urban planning as it stands, has been accused of 'addressing yesterday's problems', whilst resilience has also received accusations of having lost its meaning, as it is such a contested and abstract concept. It has been suggested that planners have been slow to take on resilience and "only in the last decade have ideas of resilience crept into planning policy debates" (Coaffee & Clarke, 2015, p.250). For

planners working towards resilience, they must increase their capacity to embrace ongoing change to ensure that planning for resilience is a continual process that they are capable of incorporating into their remit (ibid.).

There are many obstacles and challenges facing urban planners as they continue to incorporate resilience and climate action into their planning practices. Brody comments that, "understanding how planners and communities learn and adapt to changing physical and socioeconomic conditions may provide important insights into how plan quality can be strengthened to address repetitive hazardous events more effectively." (2003, p.193). The following section addresses some of the key challenges that have emerged throughout this research, that planners are currently facing working within in the resilience arena. These challenges are built upon in Chapters 5 and 6, with 'real world' examples in the two case study cities of Anchorage and Boston.

Planning for Resilience: Considerations and Challenges

Within the wider urban resilience agenda, planners must contend with a range of challenge and other stakeholders, such as representatives from urban governance systems, NGO's and community groups, as well as the citizens themselves. Through the resilience planning process, different challenges arise, often linked to the operationalisation of planning alongside the varying stakeholders mentioned above. The urban governance system present in a city has significant implications for the cities overall resilience agenda and how planners can work within it. Furthermore, the institutionalised nature of planning practice is in itself a challenge as the fundamental nature of planning must change to accommodate resilience. Building on this, the siloed working practices of planners and other stakeholder can delay or hinder the implementation of resilience practices in a city, a challenge that is sometimes exacerbated by a lack of knowledge sharing between stakeholders. This section unpacks the key challenges in detail, starting with a more overarching look at the theory of urban resilience governance, before looking into each key issue in detail and ending with a brief discussion of the potential future of resilience planning.

Urban Governance and Leadership

The planning and implementation of resilience in cities is reliant on urban government systems to act as a facilitator. Challenges surrounding how urban governments handle resilience permeate through each issue that is raised in the remainder of this chapter, such an institutionalisation of working practices and a lack of communication and collaboration amongst stakeholders. Whilst planners may have the technical and knowledge capabilities to develop and enact resilience solutions, without the support of the urban government under which they operate, any progress will be limited. Governance is therefore a pivotal factor within the urban resilience planning process.

Shamsuddin suggests that "governance systems inherently develop barriers to change, flexibility and adaptability through implementation" namely due to the "accumulated mass of bureaucratic structures." (2020, p.2). Healey (2003) using Habermas's theory of communicative action to advance ideas of collaborative planning, suggested that the underlying bureaucratic principles of urban government systems that are characterised by red tape and complicated procedural action must make way for a more flexible, collaborative and communicative approach that are socially informed and well received and goes beyond merely the "interplay of actors with specific interests" to also take into account "deeper values and conceptions." (p.106; see also Healey, 2012). This elucidates how important communication and collaboration is between and within government systems and other urban resilience stakeholders. Because planning practice does not stand alone, it must be considered within the broader urban decision-making arena, particularly when assessing planning quality and efficacy; planners are not solely responsible for their shortcomings (Brody, 2003). Overcoming parsimonious urban government systems may be a recurring obstacle for urban planners who are attempting to forge an urban resilience agenda amongst a challenging landscape of contrasting stakeholder priorities, resource constraints and climatic pressures.

As threats and stresses are increasing in frequency and scale in urban areas, city-level governments are having to shift more towards preparedness, as opposed to urgent, reactionary responses, as well as having to incorporate the broader spectrum of players in the complex city system (Medd & Marvin, 2005). Urban level governments are in the prime position to lead the attempt to build resilience in cities and address the vulnerabilities in cities in the face of climate change (Leitner et al. 2018). Within this, planners should play an important, but integrated role. Effective urban leadership is an indisputable advantage to building cohesive and continuous resilience in cities, protecting vulnerable populations and producing knowledge (Muñoz-Erickson et al. 2017).

With a more inclusive and understanding, polycentric approach to governing urban resilience, incorporating actors such as NGO's and community members, it is further suggested that a shift can occur; from looking at urban government as a single entity, to viewing it as a collaborative governance process, that allow not only for response to threats, but crucially transformation (Normandin et al. 2019). Along with planners and the wider urban governance system, "NGO's, companies and researchers promote resilience among communities and societies as a way to navigate disastrous daily conditions of the Anthropocene" (Meriläinen, 2020, p.125). As discussed earlier, there are a range of organisations dedicated to resilience, often operating at the city level. This can be beneficial to urban governments, supporting their efforts, to co-produce knowledge and inform decision making (Coaffee et al. 2020). Equally this can be a hindrance, with clashing agendas or an oversaturation of stakeholders undermining governance and planning efforts.

Also, certain urban players do not prioritise resilience and instead focus on development, which may also be the case for certain urban governments. Leitner at al. suggest that "resilience is being rolled out from the top down" (2018, p.1) and call the incorporation of resilience into urban governance a "neoliberal governance agenda in resilience clothing" (p.2). This notion of neoliberalism, and its ideologies of self-reliance that feed into broader ideas of globalisation can prioritise urban growth and development that prioritised profit over resilience (Filion, 2013). Urbanisation and urban population growth as well as increased levels of rural-urban

migration therefore present challenges for planners in regard to developing resilience; people are moving closer to hazards and higher populations create more vulnerabilities.

Furthermore, hazardous areas are often desirable locations, such as coastal areas. Regulations may be overlooked in preference for development (Wamsler, 2004). As such, whilst a strong urban governance system can potentially be the predominant positive driving force behind building urban resilience cities, political ambivalence and a penchant for a neoliberal governance arrangement, may seriously undermine the efforts of planners (Filion, 2013).

The dense network of actors contributing to the resilience agenda in both public and private sectors leaves a complex arena in which planners must operate. As well as urban governance stakeholders, the non-profit sector plays a significant role in the resilience building process in cities and can serve to both help and hamper the efforts of planners. Leitner et al. describe the involvement of public, private and non-profit players as "a multidimensional and heterogenous socio-economic formation" (2018, p.3). This formation can lead to overlaps or clashes of sector-specific agendas and priorities within a city's overarching resilience agenda, potentially causing a competitive and disjointed approach to resilience, making it harder to govern, and harder for planners to navigate (Coaffee et al. 2018).

Lang suggests that urban governance is a "predominantly incoherent amalgam of different networks…overlapping and diffusing at the same time" (2011, p.14). Urban governance systems have to find ways to balance national and international level climate change regulations with more local approaches; acting as self-contained systems whilst engaging in simultaneous symbiosis alongside multiple governance layers. This can pose conflicts regarding identifying appropriate objectives and responses, linking back to questions of decision-making responsibilities, accountability and the more overarching query of 'resilience for whom?' Furthermore, planners then have to navigate this quagmire of governance and power dynamics to push urban resilience, raising awareness and jostling for priority, whilst

also being confronted with changing their own views and approaches to their working practices.

Institutionalised Planning Practice

The deeply rooted, institutionalised practices associated with planning mean that planning as a profession and practice is facing a significant upheaval in order to embrace resilience and find success when incorporating resilience into planning practice. Bosher and Coaffee note that "professionals involved in the planning…of the built environment need to become more involved" in resilience (2008, p.145). They go on to comment that the differing definitions and facets of resilience require a transdisciplinary approach. As planners, alongside fellow built environment professionals cement their position at the forefront of resilience discourse, changes to planning practice are necessary to address gaps in a professional practice that is inherently institutionalised. It could be argued that planners are still more reactive than proactive in relation to shocks and stresses. Despite this, Füssel postulates that "the distinction between reactive and proactive adaptation may be fuzzy in practice" (2007, p.267), noting the complexities faced by planners and other relevant stakeholders; resilience and climatic adversaries are not straightforward.

Whilst "the redefinition of urban planning…for a systematic urban transition is indispensable" (Tollin, 2015, p.44), there exists still, a view that planning is inherently formal, and relates primarily to structural issues within the built environment and "planners do not generally perceive disaster risk management as being part of their sphere of activity" (Wamsler, 2008, p.301). As discussed earlier in the chapter, and in Chapter 2, planning practice is making a paradigm shift towards uncertainty however, the constraints of institutionalised rules become the norm and in turn define appropriate behaviours and condition decision making in planning practice (Healey, 1999). Furthermore, generally, planners fall within cities' governmental institutions, and institutional change can be slow (Carmin et al., 2012). The "institutional obduracy" (Coaffee et al. 2018, p.405) of planning practice can hinder the incorporation of resilience prerogatives; a lack of capacity to incorporate change and comprehend an unpredictable future can be problematic for rational,

bureaucratic institutions such as planning (Aldrich, 2012). As Lennon & Fox conclude, "the practice of planning is inherently conducted in a manner infused by a tradition of thought", suggesting that planners should evaluate their values to ensure a more "critically self-aware planning practice" (2016, p.29).

Innovation is prioritised within resilience discourse; "sustainability and resilience depend on a society's innovative capacity, [and] solutions must be found by innovating in urban systems at different scales and across sectors." (Ernston et al. 2010, p.538). However, a cities' innovative capacity can be curbed by a number of factors that make the mainstreaming and wide-scale adoption of resilience difficult. Ahern comments on the challenge this presents to planners, suggesting that in situations where cities must continue functioning under stresses, planners can fall into the trap of "relying on status quo solutions, established, proven and defensible, but not innovative!" (2013, p.1207). Innovation, that was used when historically planning in extreme environments, now becomes another priority alongside resilience, as time pressures transcend the opportunity for knowledge sharing between stakeholders, cities and beyond. But "the knowledge required for approaching urban sustainability and resilience can evolve rapidly" (ibid, p.1208); posing an urgent challenge for planners and other stakeholders, to work in unison in the pursuit of resilience.

Silos, Responsibilities and Decision Making

Siloed working conditions repeatedly emerge as barrier towards effective resilience planning where "centralised and separate disaster and planning institutions and inadequate enforcement schemes can create vulnerabilities" (Wamsler, 2004, p.18) however "the planning and construction sector is perceived as one of the most difficult development sectors with which to work, because, it is said, knowledgeable and experienced experts are rare." (Wamsler, 2008, p.302). Furthermore, planning has said to be fragmented across different jurisdictions and organisations, with different goals and different working styles. Partnered with this, extreme and extreme-ing conditions do not conveniently limit themselves to bureaucratic boundaries (Birch and Carney, 2019). Whilst multiple climate change strategies and

plans for different cities reference resilience, there is still a knowledge gap between urban planners and climate scientists: “institutional siloes are a historic problem, and climate adaptation is a renewed reason to address the challenge” (Measham et al. 2011, p. 905).

A ‘bridge’ between climate science and planning knowledge is required along with a system of support to ensure comprehensive and sustained knowledge exchange processes (Van De Ven et al., 2016) Furthermore, it is argued that climatic process and the information generated needs to be integrated into non-environmental, social processes in urban areas (Funfgeld & McEvory, 2011). It will become increasingly important for planners, climate scientists, urban designers, and many other stakeholders to combine their efforts and therefore their professional knowledge and practice in the pursuit of resilience to ensure a more collaborative approach. Van de Ven argues that “research is needed to identify how to combine measures to create urban resilience to extreme weather events” (2016, p.160). There is likely to be a move from separate urban planning and climate planning to inclusive adaption and resilience planning. Furthermore, “more needs to be known about interactions, trade-offs and synergies between urban processes and their impacts elsewhere. This entails working across disciplines and government silos” (Bai et al., 2018, p.5). This means that all those invested in urban related climate issues must work together to produce jointly acquired knowledge that can be shared across local and global platforms alike.

Füssel (2007) lists pre-requisites for resilience planning; awareness of the problem, availability of effective adaptation techniqueS, information about these measures, availability of resources for implementing these measures AND cultural acceptability of these measures, incentives for implementing these measures. A knowledge of these pre-requisites is crucial, however siloed working practices as well as decision making, and responsibility sharing is a fundamental obstacle within the urban resilience building process. Also, an in-depth understanding of climatic issues is required, beyond an awareness of the issues. This understanding must cover varying spatial and temporal scales before it can be successfully integrated into plans and planning policy (Ebrahimabadi, 2015). Understanding is also required if

knowledge sharing (between planners and climate scientists etc.) is going to be promoted as a crucial part of cities' resilience journeys (Elisasson, 2000).

Ascott and Kenny suggest that a multidisciplinary and inclusive journey towards resilience "must begin with improved communication…Cities are systems beyond their physical existence, communication between stakeholders must become as resilient as the cities they are trying to protect" (2019, p.5). Lack of coordination between stakeholders and general working incompatibilities, means there can be a duplication of efforts and incompatibilities between measures; different stakeholders have differing working practices as well as terminologies and priorities, that impede collaborative working and progress (Wamsler, 2008). Urban authorities need to systematically review current policies and regulations to assess the synergies and gaps, this requires intersectoral participatory work with actors at different levels and also needs the establishment of related monitoring and learning mechanisms. Education and awareness can be tools to promote the overcoming of silos and institutional inertia. By encompassing a broad range of well-informed stakeholders into the resilience development process, a more coordinated approach can be taken to navigate the complexities of urban resilience in planning (Mendizabel et al. 2018; Béné et al. 2017).

Struggles emerge over authority and legitimacy and decision-making spanning different spheres of influence and levels of power, planners are increasingly having to engage with urban power dynamics (Birch and Carney, 2019). It is commented that research needs to be undertaken regarding the manifestation of these struggles and their implications and impacts (Betsill & Bulkeley, 2010). Furthermore, legacy and inertia can both hinder and encourage planning change and learning (Brody, 2003). In addition, planners can often be used as a scapegoat for urban issues and are at risk of being used by urban governments to suit particular outcomes for particular stakeholders. Urban planning should be one facet of a versatile group of stakeholders that can adroitly and comprehensively address urban resilience requirements (Karaan et al., 2016). The willingness to learn is required from both the pluralistic urban authorities and the communities they are serving (Brody, 2003). By creating a forum within which knowledge can be exchanged and research shared, dialogues can be

developed, and initiatives mobilised, amongst relevant stakeholders and beyond; across various spatial scales (Füssel, 2007).

There is a call for the "haze around resilience to be addressed promptly to prevent it from following the same fate as sustainability; avoiding the debasement of the term into a 'catch-all' statement that can be manipulated, becoming artificial and ineffective" (Ascott and Kenny, 2019, p.1). Furthermore, whilst the 'vagueness' of resilience could be beneficial; its flexibility also allows different stakeholders to apply it to benefit their own agendas, potentially to the detriment of others. Aligning priorities and achieving a cohesive understanding of resilience continues to re-emerge within planning discourse, without this, the concept of resilience could be weakened (Baklanov, 2018; Meerow et al., 2016). Stakeholder disconnect remains resolute whilst the need for it to be overcome is evident. Motivation to bridge the communication gap may be missing and is stopping resilience development from being a unanimous process with incentivised stakeholders at the helm (Friend et al., 2014). Alibasic concurs that "the ability to communicate and implement a long- term vision...is instrumental for an effective sustainability and resilience strategy" (2018, p.31) and that siloes need to be broken down "to ensure a meaningful pursuit of resilience, which is one of the biggest challenges facing urban design and planning in the 21st century" (Ascott & Kenny, 2019, p.6).

Knowledge (Sharing)

It is suggested that "multiple institutional shortcomings exist, such as an insufficiently trained and undereducated civil service talent pool or the absence of a transparent and corruption-free procurement process for providing urban infrastructure" (IPCC, 2014, p.967). The possession and sharing of knowledge can form the base of many of these shortcomings, as knowledge gaps serve to stymie or undermine the resilience building process in cities.

Rosenzweig et al. suggest that "the world needs the same science-based foundation for cities that the Intergovernmental Panel on Climate Change (IPCC) provides for nations" (p.910), and that "city planners need to link climate-change issues to broader agendas. Discussions about whether to invest in a more efficient fossil fuel

power plant or renewable energy sources, for example, need to be connected to discussions about the cost of energy and localized pollution impacts of power plant operations." (2010, p.911). Similarly, Bai et al. argue, "science needs to have a stronger role in policy and practice" (2018, p.24). There are often extensive data and knowledge gaps; both the volume and expanse of data is generally lower than required, furthermore, the data quality often lapses. An additional challenge emerging from this however is, even if a broad range of extensive, high-quality data, was available, the capacity for certain professionals to interpret the data may be non-existent – knowledge gaps exist on multiple levels. Furthermore, whilst scientific knowledge needs to be developed, assimilated and understood, without an equal understanding of the less quantifiable information, implementation may be unsuccessful (ibid.).

Decision makers in urban settings need to be linked more comprehensively with scientific expertise (Rosenzweig et al., 2010). However, Van de Ven et al. argue that:

"There is a gap in the tools available to support resilient, climate-proof urban planning. Tools and procedures are available for climate vulnerability assessment and for evaluating the performance of final designs with the help of simulation models. But tools that have the ability to support implementing adaptation in the actual urban planning and design practice, i.e., to support defining the program of demands, setting adaptation targets, for selecting adaptation measures from a wide variety of blue, green and grey adaptation measures and for informed co-creation of a conceptual design, seem to be missing." (2016, p.434).

Knowledge gaps pose a fundamental frustration that is often unsuccessfully circumvented by planners and related professions. Points of contention arise over planners' lack of expertise which can result in unsatisfactory or inadequate solutions, whilst also overwhelming workloads for example. To extend upon this knowledge gap, the barrier it creates is double-edged. Highly complex climate science data stymies the pursuit of meaningful urban resilience as planners lack this specific understanding. However, climate scientists equally lack the local and social

knowledge that planners possess, creating a disconnect that also appears as a challenge in the mainstreaming of resilience (Baklanov et al., 2018; Wamlser, 2008).

Further issues regarding data also arise in this context; for example, data privacy requirements conflict with the need for data sharing and transparency, a challenge that is emerging that researchers have yet to address fully. A lack of data, particularly at the correct urban or time scales, hinders planners' ability to plan for the long-term, due to lack of evidence (Bai et al., 2018). This stalls the ability of planners to prioritise proactive over reactive planning, as long-term planning poses risks such as financial investment versus payoff, when evidence is insufficient. If reliable information about future climate change is available it reduces the cost of adaptation, and increases the coping range, thereby avoiding damage and the additional costs of retrofitting existing infrastructure at a later stage. (Füssel, 2007). Bai et al. go on to suggest that, "research and innovation for mitigating urban climate change and adapting to it must be supported at a scale that is commensurate with the magnitude of the problem." (Bai et al., 2018, p.25), a key challenge for the future with regards to the combining of climate science and planning for risk and resilience.

Utilising technology and climate knowledge is imperative to developing practical and efficient approaches to maintain resilient communities (Kenny, 2017). Scaling down climate data to the appropriate urban scale is crucial, and a lack of sufficient or accurate data can curb successful resilience strategies from being fully effective. For example, coastal storms have frequently caused havoc in cities with increasing frequency, however; "there are far fewer predictions of storm damage risks specifically at a city level, reflecting the difficulty in down-scaling the prediction of extreme events to an appropriate degree" (Hunt & Watkiss, 2010, p.278). The term 'integrated services' could be appropriate and pertinent; encapsulating the approach needed to pursue and achieve resilience in urban planning and design. Increased levels of knowledge sharing, and the reciprocal dissemination of skills and expertise is required to expedite urban resilience across city systems (Baklanov et al., 2018). Example cities include New York Cities PlaNYC 2030 where a panel of scientists provide information; focussing on win-win strategies. There is a lot of pressure and

expectation on the scientific communities to provide up-to-date data and long-term projections (Rosenzweig, 2010).

Despite the importance of knowledge in all forms of climate action, climate change denial, particularly in the (now hopefully bygone) 'era of Donald Trump' is still prevalent, and quite rife throughout the United States especially. According to Gotham, climate change deniers are an expression of "the mounting political and economic stakes of dealing with risks of anthropogenic climate change" (2019, p.17). Organised, and sustained, climate change denial is arguably led by US Conservatives across many guises from media outlets to politicians and large corporations. This widespread and invasive wave of denial polarises public opinions and priorities, whilst also ridding officials of the responsibility to bear the cost of climate change action (Dunlap and Brulle, 2015). Such comprehensive denial and misinformation at the highest level of government therefore stresses the importance of coherence across urban stakeholders and urban governance systems to recognise the realities of climate change, particularly in cities as, "the scale of the urban is of central importance" (Gotham, 2019, p.21). Cities and their representatives must cope with limited funding and a feeling of national abandonment; complex cross-scale politics at varying government levels only serve to add to the mire of climate change action. Knowledge is not necessarily power if one looks to the prevailing attitude to climate change of the current US government at the urban scale, planners and related professionals are having to ensure that public awareness is prioritised, and realistic and well-informed decisions are made; other funding routes are also having to be sought.

Mainstreaming and Futureproofing

The ideas of mainstreaming and futureproofing are emerging as resilience itself gains traction, however there are many considerations that must be taken into account when looking at the subject. Mainstreaming resilience can be understood as embedding exceptional measures into normal practice, to help build the capacity of cities and people to cope with the impacts of climatic shocks and stresses through transformative approaches to ensure that the impacts are lessened or eradicated in the

future. Futureproofing, especially for the purpose of this research, can be seen as the broader concept of cities across the world taking on the responsibility of resilience in an effort to be prepared for future shocks and stresses. The ease at which resilience could become a universally integrated concept for planners is impacted by changing urban contexts (Coaffee, 2019).

Barriers to successfully implementing or maintaining resilience in cities are heavily influenced by the aforementioned urban governance systems. Shamsuddin (2020) identified three potentialities that could inhibit resilience being comprehensively embedded in urban governance and planning practice, leading to the futureproof nature of the city being jeopardised. Fatigue of resilience can lead to stakeholders becoming desensitised to issues and response times slowing as the relentless pushing of the resilience narrative becomes overwhelming. Complacency can occur when success is being experienced in the resilience planning process, meaning efforts are reduced as resilience loses priority. Finally, overconfidence in the resilience planning approach can cause sloppiness or a lack of attention to detail. All of these outcomes can be detrimental to the resilience of cities.

Whilst it has been identified that the institutional and bureaucratic natures of urban governance and planning can impede resilience implementation successes, and a more flexible, forward-looking approach is needed, it is unrealistic to expect perpetual adjustments. Mainstreaming resilience so that it is embedded everyday planning practices means that a balance must be struck between unwavering, traditional and bureaucratic approaches to urban resilience, and having to continuously adjust working approaches to every emergent condition (Gressgård, 2017). To begin to acknowledge this balance, Olazabel & Gopegui suggest that; “adaptation needs to be integrated in current institutional and regulatory frameworks in order to guarantee sustainable adaptation action in the long-term” (2020, p.10).

Building on the idea of mainstreaming resilience, the notion of city networks is developing as an idea to help share knowledge and experience between similar urban areas, to assist in embedding the most appropriate version of resilience for the particular locale. There are challenges included in this too. City location is a key

factor in determining threats, thus requirements and priorities differ; a coastal city will suffer differently to one inland; mainstreaming the resilience building process must account for these significant differences as planning responses will vary comprehensively based on the physical geography of a city (Walmser et al. 2013; Betsill & Bulkeley, 2006).

However, by developing regional, national or even international networks of cities that share commonalities, such as the climatic threats they face, planners and other urban stakeholders can compare and learn so that understandings can be developed, inspirations can be gleaned, and partnerships may be forged. Different contexts provide different experiences and outcomes, and varying approaches can apply in similar cities around the world, which, if merged with local, neighbourhood level strategies, could provide a holistic approach to resilience; "research and policy frameworks need to be developed to translate successful local initiatives across cities" (Bai et al., 2018, p.25). Furthermore, focussing on a more localised urban scale allows for the related climate issues to be grounded and more accessible to relevant local stakeholders who can tailor their approaches to be more specific (Hunt & Watkiss, 2011).

The Future of Resilience?

Coaffee & Lee (2016) suggest that planning for resilience will continue to be beset with uncertainty and therefore must remain flexible. This can begin to be accomplished if resilience is a planning priority and is incorporated into day-to-day planning practice, becoming a benchmark, within a more iterative planning approach that acknowledges the unknown (Brody, 2003). It is essential that resilience is integrated across all stages of planning, allowing it to percolate through different scales, both temporal and spatial (Kenny, 2017; Ascott & Kenny, 2019).

Cities are having to act independently and forge new paths to plan for the unknown (Carmin et al., 2012). Resilience itself is an unknown to some extent; repeatedly prioritised in modern planning agendas, the question of 'when is resilience achieved?', has yet to be answered. Questions have emerged regarding how to quantify resilience to understand when the end goal of resilience is reached, if it is indeed viewed as a tangible goal (Béné et al. 2017). Assessing and quantifying

resilience continues to be a complex concept. Varying 'assessment frameworks' have been developed or proposed to aggregate the wide interpretations of resilience into a manageable and applicable concept. Borden commented that "it is vital…[to] develop science-driven analyses to support such place-based analyses of vulnerability at all spatial scales" (2007, p.17).

Despite this, differing cities face assorted climate change related challenges and the needs of their populations also vary; as such, finding a universal 'baseline' may be impossible, meaning resilience may be required to be assessed on a more granular or local level, hindering its mainstreaming (Jabareen, 2013). Beyond this, Satterthwaite and Dodman consider what comes after resilience:

> "to go beyond resilience to transformation means having adaptation policies and investments integrated with development that really meets needs (including those of low-income groups), while also addressing mitigation and, where needed, over-large ecological footprints. This obviously requires fundamental changes in the supporting political and cultural systems. We are far from understanding what can support these changes at local, national and global scales." (2013, p.297).

To develop future resilience strategies, it is also crucial to understand the interplay between climate change impacts and other factors in the urban context, which may exacerbate the impacts, such as population growth or energy consumption (McCarthy et al., 2010). By working with a combination of measures, a more inclusive and comprehensive approach to building resilience in cities can begin to be achieved; focussing on more context specific strategies that have strategically focussed on priorities that require the most urgent attention (Van de Ven et al., 2016). Moreover, by making initiatives more tailored to their specific locales, more abstract planning concepts that non-experts struggle to understand can be contextualised to encourage wider engagement with resilience planning (Brody, 2003). As well as an inclusive and unambiguous approach, urban resilience requires capacity growth, of planners, local communities, urban governments and more stakeholders, and as such, needs the support for the capacity to be built in the first

place (Major et al., 2011). Stakeholder engagement and communication emerge as some of the most vital facets within the resilience building journey that cities are embarking upon yet is also one of the most overlooked and challenging components that must be addressed.

There is research lacking regarding the amount of time it takes for ideas or concepts, such as resilience, to become reality within the planning process, even more so, how quickly these ideas then become implemented is another question that needs addressing more comprehensively. Furthermore, "scholars and practitioners, primarily due to data constraints, rarely study the question of whether planners, community members, and other contributors to the development of local plans are learning over time." (Brody, 2003, p.191). As resilience is arguably still a relatively new planning priority, it is yet to be fully seen how much success planners are having with its implementation.

Urban planning is one component of a larger resilience agenda; cities are commencing 'resilience journeys' across the world, all at different paces and with contrasting priorities and resources. Planning's role also differs depending on location and type of climate change challenges faced, though it is often underutilised or undermined, overlooked as a pragmatic tool within the resilience agenda, simply put; "planning is about making recommendations about who should do what, more, less, or differently, and with what resources?" (Füssel, 2007, p.268), and for cities "the ultimate goal, therefore, when using [urban planning] techniques to protect against the climate, is not to completely eradicate it, but to exist, embrace, adapt and where possible, benefit from it." (Kenny, 2017, p.140).

In Chapters 5 and 6 the case studies of Anchorage and Boston are presented to illuminate attempts to operationalise resilience principles in climate action planning providing 'real-world' explorations of these processes in extreme and extreme-ing urban environments. These case studies are underpinned by a detailed methodological approach taken over the course of the research that is explored in the next chapter.

Chapter 4
Methodology

Background and Rationale

"Qualitative data collection and analysis is always messy" (Breen, 2006, p.2). Undeterred by this, the methodological approach of this project takes a comprehensive qualitative approach. Qualitative methods, particularly in planning related research, are essential to yielding insight into the working practices, interactions and approaches that quantitative methods cannot do alone (Dandekar, 1986; Noble & Smith, 2015). Criticisms of qualitative methods are grounded in their tentative nature, often less formal or established than quantitative approaches; their more experimental existence relies more heavily on the skill of the researcher and their interpretative abilities.

Dandekar highlights three sub-categories of qualitative methods that relate specifically to planning research: "Study of the Built Form…Study of Human Interaction…Study of Planning Process and Organization Structures" (1986, p.3). Together these combine observing and analysing the physical, tangible urban form, the interactions between people (and place) and the experience of planning; subjects that cannot inherently be quantified. Moreover, when assessing complex planning processes "plans and similar policy statements are evolving instruments that undergo continual revisions and updates" (Brody, 2003, p.191). Which must be taken into account when analysing each plan to ensure that everything is up to date.

In light of a focus on the processes underpinning planning practice, the methodology took an inductive, empirical approach in order to answer the aims of the project, understanding the role(s) that urban planning plays in the resilience building process in extreme and extreme-ing urban environments. This helped to address research questions as set out in the introduction and again below.

Overarching Project Aim
To investigate and understand the role that urban planning plays within the resilience building and climate action planning process in specific extreme and extreme-ing city contexts.
Objectives/Research Questions
• To what extent have planners been historically involved in wider processes of mitigating and adapting to the effects of climate change in cities?
• What roles are planners taking in newer, future-looking resilience building processes?
• How do visions of, and approaches to, resilience differ between extreme and extreme-ing cities?

Table 3. *Research Aims, Objectives and Questions*

In order to answer these questions, the project took a comparative case study approach to investigate resilience planning in practice. According to Godschalk, "case studies are a useful way to explore new processes and their outcomes. They provide reliable information, which can be used to generalize a phenomenon." (2003, p.6). As such, identifying two case study cities allowed for in-depth observational data, and data from discussions, to be collected and compared, allowing for an interrogation into planning and resilience processes in the chosen cities, utilising both interviews and document analysis methods. According to Yin (2014), a comparative case study approach allows for exploratory, descriptive and explanatory research and analysis. Yin also suggests that when selecting case studies, the study location should be 'extreme' or 'typical', as such, the choices of Anchorage as an extreme example, and Boston as a typical, or extreme-ing example, cover the crucial elements of case study selection (2009). Furthermore, as both cities have recently published or updated climate/resilience related plans, fortuity dictated that the cities, along with their 'extreme/ing' characteristics, would be good choices. Chapters 5 and 6 provide further insight by elaborating upon the case study city choices. As case studies serve to illuminate decision making processes and professional practices whilst grounding them in a real-world context, a qualitative

case study approach was the sensible choice for the overall methodological approach adopted.

The analysis of the qualitative data produced during the research process fell in line with an inductive approach. It should be noted that the analysis process, described in the upcoming chapter, should not be viewed as a rigid procedure, rather a fluid process that evolved as information was uncovered (Røe, 2000). Using an inductive approach to analyse the data collected for this project allows for initial observation before the development of a hypothesis and subsequently theories and conclusions can be drawn. An inductive approach lends itself to the study of processes in cities; how systems such as resilience and climate action function within planning practice in the wider urban context is not easily quantified, as such a deductive approach would hinder answering the 'why and how' questions that comprise an aspect methodological approach (Yin, 2014).

Research Design

The methodological approach of this project was divided into three stages, with the interview and document analysis running parallel to each other. To visualise the process, Table 4 outlines each stage of the research process.

Stage 1

In Stage 1, the pre-analysis stage, the overarching research questions for the project were developed based on an initial literature review and the author's discretion. They were subsequently used to shape and inform the analysis throughout the research. The material for Anchorage and Boston, to be used in the document analysis, was identified in Stage 1, as were many potential interviewees and interview questions.

Stage 2

For the document analysis portion of Stage 2, pre-selected documents were analysed and coded with QSR International's NVivo 11 Software. Fieldwork was also

conducted during Stage 2 and detailed notes from each interview were produced and initially analysed.

Stage 3

Stage 3 entailed the combined analysis and discussion of the data produced in Stage 2 from the document analysis and interview processes. This stage of research was more loosely structured as various narratives emerged from the analysis. Additional planning documents were also incorporated into the document analysis aspect of Stage 3, that had either not been originally identified in Stage 1 or had recently been published. As a result, the intertwining of outcomes and evolution of the research process ensured a focussed but flexible research design that uncovered a range of narratives that illuminated urban planning's role within urban resilience and climate action processes in cities.

Stage 1 ***'Pre-analysis'***	Development of objectives/research questions.	
	Selection of case study cities.	
	Identification of documents for both case studies.	
	Identification of interviewees & development of interview questions for both case studies.	
Stage 2 ***Document analysis & interviews***	**Document analysis** Coded using NVivo.	**Fieldwork Interviews** Conducted in Anchorage, Alaska & Boston, Massachusetts in April 2019.
Stage 3 ***Combined analysis & discussion***	Combined analysis of document analysis and interview data.	
	Identification of similar and contrasting narratives.	
	Inclusion of additional documents and areas of interest based on the outcome of Stage 2 analysis.	

Table 4. *Research Stages*

Research Methods

As highlighted above, data collection utilised a combination of key research methods to collect data for the case study cities of Anchorage and Boston, to investigate the resilience planning processes in both. The detailed methodological processes undertaken are illuminated below.

Document Analysis

Utilising documentary analysis provides tangible evidence of, in this case, planning practices, processes and policies. This methodology can help to assemble timelines of actions, as well as solid examples of planning interventions, stakeholders and events. Biases, again, can emerge with the use of this method, through the selection of documents, or through the unknown bias of the author (Yin, 2014). Document analysis provides a robust and stable basis to help triangulate the case study-based research whilst allowing a broader overview of planning processes, that can be expanded upon through interviews other qualitative methodology. The overarching nature of the research has remained exploratory in nature, to avoid a stifling of research efforts and discovery. Thus, whilst separating the document analysis into separate stages, alongside interviews, overall, final, analysis was conducted simultaneously, to ensure the full spectrum of evidence was investigated and considered as a whole. In addition, as discussed previously, the documents were placed within the wider urban context during analysis (Flick, 2004).

Document analysis as a qualitative method to examine relevant documents helps to produce understandings and develop interpretations, meanings and narratives from the analysed material. By identifying pertinent documents, an investigation can be undertaken, and findings may be produced and subsequently categorised and further analysed to provide empirical evidence and build context within the study (Corbin & Strauss, 2008; Labuschagne, 2003). Using a case study-based, documentary analysis helps to illuminate information and patterns, often regarding decision making and implementation processes; in this case this is vital to understanding urban planning in practice for resilience (Yin, 2014). When used in conjunction with other relevant

research methods, document analysis can provide important, admissible data and information through thorough analysis (Altheide, 2000).

Lees suggests that it is often the case that "urban geographers have not always been as clear about the theoretical roots and methodological suppositions of their claims about discourse" (2004, p.101). Indeed, the skill of undertaking a documentary analysis, and more so, outlining the process that the research utilised is "not easy to render or describe in an explicit manner" (Davies et al. 2002, p.165). For this project, the method of document analysis was chosen as part of the methodology to build upon the background and theoretical basis of the project and provide relevant, context specific examples of the process of planning in practice for urban resilience. As the project investigates the role urban planning plays in cities regarding the practical utilisation of planning as a tool to build urban resilience, it was imperative to investigate 'real world' processes. The case studies of Boston and Anchorage were chosen not only for their extreme and extreme-ing characteristics, but also their recent, or ongoing policy publications of resilience related plans. For example, Boston, under the umbrella of the Rockefeller 100 Resilient Cities initiative, published its Resilience Strategy in 2017. Anchorage published its Climate Action Plan in May 2019.

Undertaking a document analysis is not a strictly defined process or set of steps. This project designed an analysis that aimed to investigate and understand the role of urban planning for resilience, particularly within the context of urban resilience related documents, using stages of analysis and integrating related methods and data. The documents chosen for this analysis consisted principally of plans produced by the municipal governments of Boston and Anchorage, in relation to either resilience specifically, or more broadly, climate change. This selection of documents provided detailed evidence of the resilience or climate action 'plan-building' process. Furthermore, these documents supplemented data collected during fieldwork, providing verification, raising questions and supporting the overall methodology (Bowen, 2009).

This verification process is important as Atkinson and Coffey comment that "we cannot…learn through records alone how an organization is actually operates day-by-day." (1997, p.47), hence, the fieldwork section of the methodology, including semi-structured interviews, complement the document analysis portion, providing additional insight. Documentary analysis is also helpful for providing a more overarching view of trends, themes, patterns and information within documents, assisting in developing timelines or narratives of information. Undertaking a comprehensive document analysis, combined with collecting empirical data via interviews therefore allowed a well-rounded and in-depth understanding of the resilience planning process to develop.

Document Analysis Research Design

Using document analysis provides empirical insight via secondary data. In aiming to logically understand and answer a range of initial questions regarding the documents, the document analysis process was carried out chronologically for each case study city, and divided into the three aforementioned stages. Stage 1, the initial pre-analysis stage, used the overarching project research questions to guide and inform the analysis approach and to identify all of the relevant documents. Stage 2 consisted of developing a coding system based on the overarching research questions and applying it to the documents. In Stage 3 additional documents were analysed, alongside the data produced from the fieldwork. Stage 2 used pre-selected documents and Stage 3 included additional documents that were unearthed as a result of Stage 2. To allow for flexibility and dynamism within the analysis process, detailed notes were made throughout to identify any trends or key phrases that were not covered in the initial, pre-defined codes. Thus, for the final stage (3) of the document analysis, a softer, less regimented approach was taken, based on the pre-existing codes and newly identified areas of interest. Additionally, incorporating a wider range of documents into the final stage allowed for a targeted yet flexible analysis process which was used to build context and increase inference whilst remaining objective and perceptive throughout (Bowen, 2009). Furthermore, doubling up the analysis allowed for further exploration into factors such as the biases and authenticity of the documents, as well as providing more background and

contextual information. In addition, questions that arose during Stage 2 of the document analysis process could also be incorporated into interview questions to illuminate any issues that may have arisen during the document analysis.

During the coding process, predefined codes can be used in cases where document analysis is not the only form of research method used within the study and can be used to synthesise data across the study (Bowen, 2009; Yin, 2014). Codes can be developed to infer relevance, thus streamlining the analysis to triangulate data whilst also remaining pragmatic (Corbin and Strauss, 2008). By initially coding all pre-selected documents in Stage 2 of the document analysis process, initial patterns and narratives were able to be identified relatively quickly and efficiently; the coding process also illuminated the key foci of each document, as well as any gaps in the data, allowing Stage 3 of the analysis to focus more easily on key findings and missing data. Using NVivo for Stage 2, all pre-selected documents underwent the coding process, with key codes and patterns being identified. The following image shows the colour coded codes and sub-codes used during the coding process:

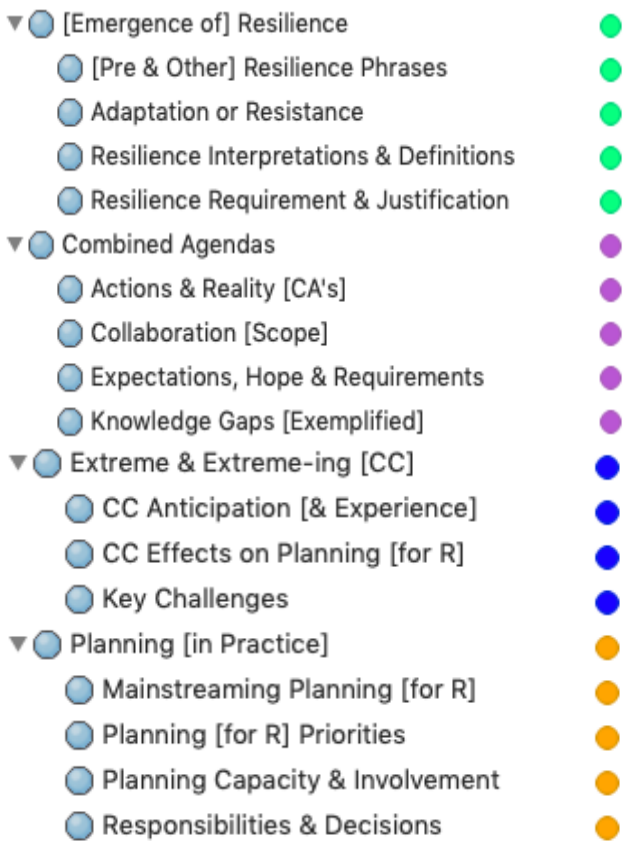


Figure 2. *Document Analysis NVivo Codes*

The codes followed 4 overarching themes (*Emergence of Resilience, Extreme & Extreme-ing/Climate Change, Planning in Practice and Combined Agendas*) with sub-themes tailored to suit the document analysis method. These themes were utilised in the document analysis portion of the research just to help focus and guide the coding process; the themes were also used to help shape the interview questions. In addition, more general considerations were developed to assist with the analysis of the documents; whilst not context or case study-specific, they helped to focus the analysis by developing an understanding of the underlying purposes of the documents and beginning to build a narrative (these considerations were also applied in the interviewing process). Examples of these can be found below:

- How is urban planning as a tool for resilience incorporated?
- Is planning involvement over or under-represented?
- What is the overall vision – for what reason has the document been produced?
- What is the policy rhetoric?
- Who has produced the document and what is their agenda?

Throughout the coding portion, the NVivo software allowed for quick analysis and comparison between documents. The software allowed for the codes to be broken down for each document, showing how often each code appears, thus beginning to give a broad idea of the priorities within each document. An example can be seen below:

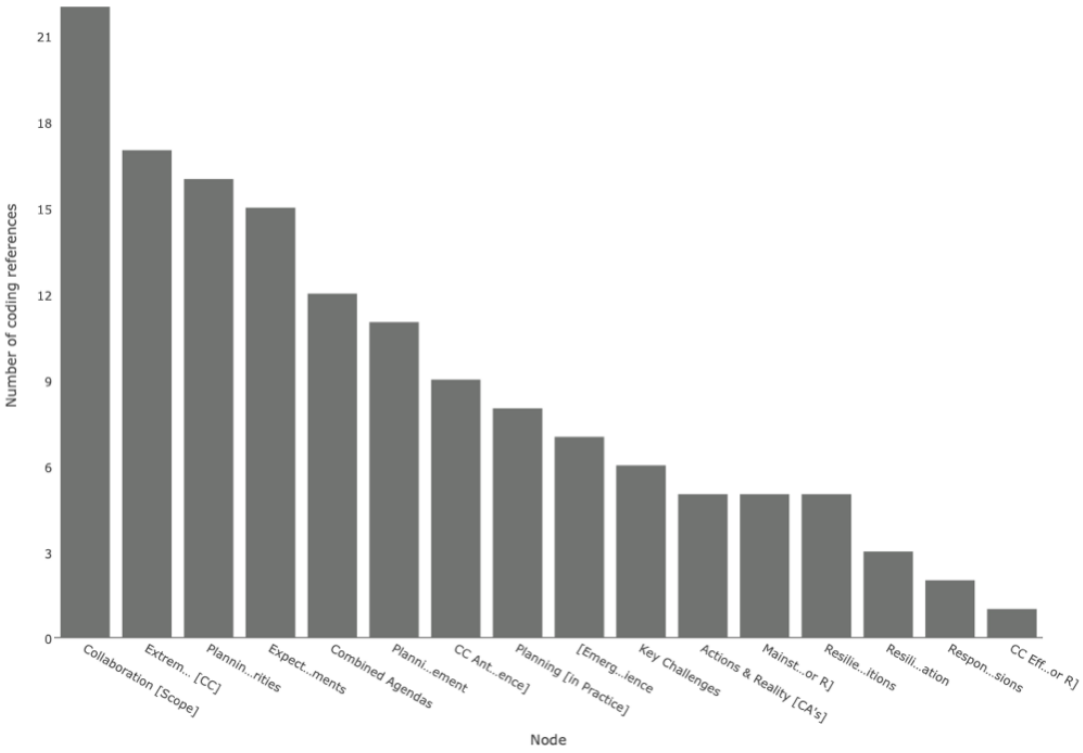


Figure 3. *NVivo Coding Results for 'Climate Ready Boston'*

As discussed, Stage 3 of the analysis process incorporated additional documents, including those mentioned in the initial analysed documents or those mentioned during fieldwork interviews, for example. By incorporating additional documents into the second analysis stage, context was able to be more fully developed.

To ensure detailed and dynamic analysis, more general, informal questions, or comparison points, emerged and were subsequently interwoven throughout the analysis, which helped build narrative and develop the comparative review process. Whilst these questions were not formally posed, they existed as considerations for both the document analysis and interview portions. For example:

- How is planning defined?
- How is resilience defined and are there contradictions across departments/organisations in cities?
- In what capacity are communities involved or mentioned?
- Is there evidence of mainstreaming and coordination and in what context/capacity?

Documents

A wide range of documents were selected for analysis, focussing on the case studies of Boston and Anchorage. Scott's criteria of authenticity, credibility, representativeness and meaning were acknowledged and applied, from selecting the documents through to each stage of analysis (1990). As the overall project tends toward a future-looking outlook; understanding what strategies need to be put in place to allow for a streamlined process of resilience planning and decision making must begin with understanding and interpreting existing relevant documents. As such, the majority of documents selected for the analysis were resilience and planning related documents produced by the cities in question. Where there was a lack of plans and documents produced by the city, notably in Anchorage, some non-municipally produced documents were included in the analysis and were chosen for their links to the resilience and climate change agenda in the city. It is acknowledged that whilst assumed authentic, a certain bias is likely to be present in each document, ensuring the city in question is portrayed in a positive light. As there is a focus on larger-scale city plans in the document analysis and interview part of the project, there is perhaps an underrepresentation of private planners and any documents they may have produced. Nonetheless, all relevant city and neighbourhood-level documents for both case study cities have been thoroughly represented, to allow for comparison between the two cities, and further afield. Furthermore, the interconnectedness of public urban planners and other municipal departments is undeniable, therefore the focus remains on the public sector. Documents prior to the 21st century were omitted for detailed analysis but may have been referred to during the discussion in Chapters 5 and 6. The full range of documents used for both Anchorage and Boston can be found in the tables below.

ANCHORAGE		
Title	**Date Published**	**Authors/Contributors**
Anchorage Climate Action Plan	May 2019	Municipality of Anchorage (Multiple Departments - Mayor Ethan Berkowitz)
Municipality of Anchorage Climate Action Strategy	May 2019	Municipality of Anchorage (Multiple Departments - Mayor Ethan Berkowitz)
Draft Anchorage Climate Action Plan	March 2019	Municipality of Anchorage (Mayor Ethan Berkowitz)
Resilient Anchorage Roadmap	September 2017	Municipality of Anchorage (Mayor's Corner - Ethan Berkowitz)
Welcoming Anchorage Roadmap	September 2017	Municipality of Anchorage (Mayor's Corner - Ethan Berkowitz)
Anchorage 2040 Land Use Plan	September 2017	Municipality of Anchorage (Planning Department - Mayor Ethan Berkowitz)
Anchorage Energy Landscape and Opportunities Analysis	May 2017	Municipality of Anchorage (Multiple Departments - Mayor Ethan Berkowitz)
Risk Report - Municipality of Anchorage	January 2017	FEMA, Municipality of Anchorage, Alaska Geological and Geophysical Surveys
All Hazards Mitigation Plan Update	December 2016	Municipality of Anchorage (Multiple Departments - Mayor Ethan Berkowitz)
Key Insights on Business, State and City Collaboration for a Resilient Anchorage	April 2016	Center for Climate and Energy Solutions (C2ES)
Climate Change Impacts in Anchorage	March 2016	Center for Climate and Energy Solutions (C2ES)
Proposed Climate Action Plan for the Municipality of Anchorage	June 2009	University of Alaska, Anchorage (Multiple Departments)
Destination Downtown: Anchorage Downtown Comprehensive Plan	December 2007	Municipality of Anchorage (Multiple Departments - Mayor Mark Beigh)
Destination Downtown: Anchorage Downtown Comprehensive Plan	August 2007	Municipality of Anchorage (Multiple Departments - Mayor Mark Beigh)
Anchorage 2020 - Anchorage Bowl Comprehensive Plan	February 2001	Municipality of Anchorage (Multiple Departments - Mayor Mark Beigh)

Table 5. *Anchorage Documents*

BOSTON

Title	Date Published	Authors/Contributors
City of Boston Climate Action Plan Update	September 2019	City of Boston (Multiple Departments – Mayor Martin J. Walsh)
Coastal Resilience Solutions for South Boston - Final Report	October 2018	City of Boston, Greenovate Boston, Massachusetts Office of Coastal Zone Management, Barr Foundation, Boston Green Ribbon Commission
Coastal Resilience Solutions for East Boston and Charlestown - Final Report	October 2017	City of Boston (Multiple Departments – Mayor Martin J. Walsh), Greenovate Boston, Massachusetts Office of Coastal Zone Management, Barr Foundation, Boston Green Ribbon Commission
Resilient Boston - An Equitable and Connected City	July 2017	Rockefeller 100 Resilient Cities, City of Boston (Mayor's Office of Resilience & Racial Equality - Martin J. Walsh)
Imagine Boston 2030	July 2017	City of Boston (Multiple Departments – Mayor Martin J. Walsh)
Climate Ready Boston - Executive Summary	December 2016	City of Boston (Multiple Departments – Mayor Martin J. Walsh), Greenovate Boston, Massachusetts Office of Coastal Zone Management, Barr Foundation, Boston Green Ribbon Commission
The Blueprint - A Preview of the Principles & Framework for Boston's Resilience Strategy	November 2016	Rockefeller 100 Resilient Cities, City of Boston (Mayor's Office of Resilience & Racial Equality - Mayor Martin J. Walsh)
Boston's Preliminary Resilience Assessment	April 2016	Rockefeller 100 Resilient Cities, City of Boston (Mayor's Office of Resilience & Racial Equality - Mayor Martin J. Walsh)
Greenovate Boston - 2014 Climate Action Plan Update	July 2014	City of Boston (Multiple Departments - Mayor Martin J. Walsh)
Climate Ready Boston - Municipal Vulnerability to Climate Change	October 2013	City of Boston (Multiple Departments – Mayor Thomas M. Menino)
A Climate of Progress - City of Boston Climate Action Plan Update 2011	September 2011	City of Boston (Multiple Departments – Mayor Thomas M. Menino), Green Boston
Sparking Boston's Climate Revolution	April 2010	City of Boston (Multiple Departments – Mayor Thomas M. Menino), Climate Action Leadership Committee, Community Advisory Committee
Climate: Change - The City of Boston's Climate Action Plan	December 2007	City of Boston (Multiple Departments – Mayor Thomas M. Menino)

***Table 6.** Boston Documents*

Fieldwork and Semi-structured Interviews

Interviews as a form of qualitative methodology provide an in-depth look into the experiences of various stakeholders, and the roles they play, providing a well-rounded source of data when combined with other methods described above (Turner, 2010). The semi-structured nature of the interviews meant that the general questions were grouped and themed to resemble each other from interview to interview but could be tailored to the expertise of the specific interviewee. The interviews produced a significant quantity of data and the responses provided a range of narratives to expand upon and enrich the data revealed by the document analysis process. Yin notes the, often unintended, biases that can occur through the interview process, both from the interviewer in terms of the wording of the questions, and from the interviewees, who may alter their answers to produce a certain, acceptable narrative (2014). Gall, Gall and Borg suggest that whilst analysing this quantity of qualitative interview data is cumbersome, interviewee bias is lowered as the researcher filters through responses to extract code as themes (2003). Semi-structured interviews, require labour intensive work to conduct, code and analyse, it is also suggested that, whilst an abundance of data is often produced, text-based analysis and discussion cannot fully incorporate the nuances and discourses that occurred in the interview setting (Choy, 2014; McLellan et al. 2003). Nonetheless, interviews allow for targeted research, to build context and allow for reflexivity and casual deductions to emerge out of the analysis (Yin 2014). This leads to the production of insightful and robust data that, in this context, elucidates the ways in which climate action and resilience agendas unfold in the case study cities.

Interview Research Design

Alongside the document analysis portion of the methodology, semi-structured interviews and a focus group (consisting of 10 Municipality of Anchorage planners) were carried out during fieldwork in Anchorage and Boston in April 2019. Interviewees in both case study cities were identified by their expertise and the stakes they held in the overall resilience and climate action planning processes within the cities, particularly in relation to the production of specific plans and

planning documents. Interviewees ranged from city planners to mayoral advisors, academics, non-profit co-ordinators and climate activists; representing organisations such as the Boston Planning and Development Agency, Boston Green Ribbon Commission, Climate Ready Boston, Massachusetts Institute of Technology, the Municipality of Anchorage's Planning Department, the Municipality of Anchorage's Mayor's Office, the Smithsonian Arctic Studies Center and the University of Alaska, Anchorage. By selecting 30 interviewees across the two case study cities, who represented varying positions on the resilience spectrum, a comprehensive range of data could be collected to build rich context and narratives. Interviews were arranged in advance via email contact; a brief summary of the research project and example questions were also provided prior to the interviews taking place and consent forms to fulfil ethics approval requirements were signed in person before the interviews commenced. Interviewee names and exact job roles have been kept anonymous in accordance with ethics requirements. In addition, before the fieldwork, interviewees were asked if they were comfortable with the interviews being recorded, as most declined, interviews were not recorded in adherence with ethical protocol (ethics approval was sought and granted for the fieldwork and interview portion of the research process).

As mentioned in the above section, themes were developed to guide and focus the coding aspect of the document analysis research. To ensure consistency, the interview questions were also guided by the 4 themes (*Emergence of Resilience, Extreme & Extreme-ing/Climate Change, Planning in Practice and Combined Agendas*) alongside the objectives of the research project. Whilst the interview questions largely followed the same structure, they were tailored a little depending on the profession of the interviewee, to ensure that the most relevant questions were being asked and answered. Below is an example of some of the sections and interview questions used during fieldwork, aimed at a planning professional:

Discussion of [their involvement with] Resilience Strategy/Climate Action Plan

Role of planning in resilience process

- How were responsibilities shared, decisions made, and challenges prioritised?
- Can the planning for resilience process be streamlined/mainstreamed? - Is there scope for more involvement of urban planners?
- How were key stakeholders identified/prioritised in the resilience planning process?
- Planning involvement – over or under-representation?
- Which committees drive agendas?

Planning engagement in resilience process

- At what capacity is planning currently being used as a tool for building urban resilience?
- What are the knowledge gaps and is there scope for increased collaboration and co-operation with other resilience-related professions?

Changing nature of planning

- How did urban resilience emerge as a planning concept in _____ and what came before?
- Did _____ experience with extreme weather events significantly help with the resilience planning process?

The questions asked were open-ended, intended to steer conversation whilst allowing the interviewee to focus on their own priorities and interests. The interviews were more informal, following a discussion style guided by the overarching interview questions, allowing discourse to flow and the modification or addition of questions based upon the interviewees' responses. Interviews lasted on average 60 minutes and detailed notes were made throughout, these notes were used for the analysis. Following the completion of the fieldwork and interview portion of the research, notes from each interview were transcribed, coded using the same codes and Nvivo

software as the Document Analysis (detailed below), and analysed alongside the document analysis data in Stage 3.

In addition to the one-on-one interviews carried out during the fieldwork in the two case study cities, a focus group interview was held with the Municipality of Anchorage Planning Department. Representatives from both the Current and Long-Range Divisions were present. The results, (discussed later), were simultaneously illuminating and mildly alarming. Utilising a focus group interview in this context allowed for discussion and debate, based upon the same set of questions used in the one-to-one interviews, with the added opportunity to concurrently observe and engage with a broader scope of opinions and ideas (Chacko, 2004). Furthermore, a focus group can allow for a less formal setting, where the researcher can observe discussions between participants, as well as with the researcher themselves, to investigate points of agreement and tension and areas of interest or disinterest, in this case, in climate change impacts, for example.

Data Analysis Process

This section will provide a brief overview of the analysis process taken to jointly analyse the results from the document analysis and fieldwork interviews. For the empirical chapters and discussion, it was important to bring together all the data to ensure that the most well-rounded narrative possible could be formed. The research questions provided the basis of the framework of analysis. The 4 themes mentioned earlier, also helped to shape the data collection process for both the document analysis and the interviews, and thus the outcomes were roughly categorised, allowing for the structure and comparative elements of the analysis and discussion to be guided. When writing the empirical chapters, the analysis also followed a generally chronological framework, particularly pertaining to the data from the document analysis. Documents were divided up into 'phases' and 'phaseology' tables were created for Anchorage and Boston. The plans in the phases were grouped generally chronologically but based on a number of other factors. These included categories such as links to particular schemes or initiatives (i.e. Rockefeller 100 Resilient Cities) or authorship (i.e. municipal or non-municipal). Each phase for both

cities was given a heading based on the key intentions and outcomes at that particular planning stage. Once these phases had been established based on the document analysis data, this data and the interview data were intertwined to build the narrative. The interview data was analysed based on the aforementioned themes as well as references to particular plans, links to particular phases, and mentions of similar issues. It was then incorporated into the empirical chapters based on the outcomes. Sensitive or confidential material was omitted. The discussion chapter was structured based on the outcomes of the two empirical chapters, bringing together Anchorage and Boston to compare and contrast.

Research Constraints and Limitations

In choosing the case study city of Anchorage, this was determined by the first manifestation of the original PhD project that focussed on urbanisation and resilience in the Arctic. After agreeing with my supervisor on the limiting nicheness of this idea, the project change significantly over the course of research, but did mean that Anchorage was already established as a case study, so as not to waste the initial work. Thus, the focus on North America was established before the final version of the project came to fruition and drove the research in a particular direction.

The international focus of the project, whilst very interesting, also posed some roadblocks over the course of the research. Finding a range of interviewees with relevant expertise and scheduling interviews over the course of a week in each case study city proved challenging and meant that some useful contacts were not available to meet with in person. Furthermore, the distance to travel meant that only one fieldwork trip could be completed, and follow-up trips were not an option. Following on from the case study limitations, the sheer volume of plans and literature produced by both cities, particularly Boston, at first proved challenging to curate into those to include and those to omit from the research.

Overall time constraints limited the amount of time that could be dedicated to the document analysis process, as such, using the author's research acumen, certain documents were omitted if not deemed sufficiently relevant. Furthermore, the

limited time hindered the longitudinal tracking of the evolving process of resilience planning in Anchorage and Boston, as only a short window of time was available to analyse.

Challenges emerged regarding access in particular to online media outlets, as a result of General Data Protection Regulation (GDPR), which has rendered most US-based media outlets unavailable in Europe. It was also hoped that archival documents could also contribute more comprehensively to the document analysis, however, privacy and cost issues in Boston impeded this endeavour. In Anchorage, the relative newness of the city, along with limited historical documentation meant that the archival data here was non-existent. Inevitable roadblocks, such as cancellations and no-shows, emerged during the interview process, this was anticipated and therefore overcome easily by over-estimating the number of interviewees required.

The outbreak of Covid-19 coinciding with the thesis-write up stage also proved challenging due to having to work from home with limited access to resources.

In the upcoming chapters, the main body of this thesis presents the data collected during the research. Analysis of the data produced by the interviews and focus group is interwoven amongst the document analysis data produced, to provide a wholistic investigation into, and view of, planning in practice for resilience and climate action in Anchorage and Boston. This is followed by a discussion and comparison of the two cities.

Chapter 5
Anchorage Case Study

Introduction

Case study 1 investigates the city of Anchorage, an extreme city in the state of Alaska, USA. The city does not have a long history of urban planning, and an even shorter history of planning for climate change and resilience specifically, 2019 saw the publication of the first plan solely dedicated to addressing climate change threats in the city. In recent years, Anchorage has faced a range of challenges and hindrances along its journey to enact resilience and climate action. Most notably, the climate change denial rhetoric espoused by the Trump administration, which has compelled many cities in the US to address climate change at the municipal level, has created a series of tensions in the city, unsettling approaches by planners and other stakeholders. As this chapter will explore, specific challenges emerged such as the capacity of planners in the city to incorporate resilience into their daily work, alongside significant knowledge gaps, and a more overarching culture of institutional immobilisation, stakeholder disconnect and siloed working across the municipality. Notions of accountability (or the lack thereof) also arose during analysis; the responsibility of resilience is shared across departments and stakeholders, though ownership is rarely fully taken. A strong and committed leadership is however, present in the city, although it is faced with steadfast opposition and in some cases, absolute denial of the presence of climate change, that is limiting the extent to which that the city can undertake the required paradigm shift in planning practices towards urban resilience.

The chapter begins by providing a contextual and historical overview of Anchorage, physically, socially and governmentally, including a breakdown of the Municipality of Anchorage Planning Department. In the second section, the climate action and resilience 'journey' of Anchorage is introduced; the issue of climate change denial at varying governmental levels, and the subsequent issues of responsibility is expanded upon. This is followed by an exploration of how climate action emerged in the city,

as a result of administrational changes and positive mayoral influence. Beyond this, the chapter focusses on the analysis of Anchorage planning documents to understand the evolution of climate action in the city, with particular focus on practices of resilience. The following phaseology table provides an overview of the different phases or versions that climate action in Anchorage has taken, grouping together key planning and related documents to provide an overview of the various approaches to climate change and planning in the city; it also reflects the structure of the chapter.

Phase	Plans	Emphasis
Citywide & Neighbourhood-level Municipal Plans – Growth, Management & Geohazards	Anchorage 2040 Land Use Plan (2017)	A focus on growing Anchorage as a city: *'Placemaking & Growth Supporting'* Acknowledgement of protecting the environment and responding to threats (not specifically climate change): *'Geohazards management'* Neighbourhood plans introduced; acknowledgement of climate change and threats remain broad and specific planning actions are brief: *'Remain operational'* Resilience used in the 2040 plan – however specific actions for planners are still not outlined: *'Minimizing risks'* Community engagement is utilised: *'Community Resiliency'*
	Anchorage 2020 Land Use Plan (2001)	
Non-Planning or Municipality Climate Related Plans – Disconnect, Business & Economic Growth	Climate Change Impacts in Anchorage (*Center for Climate and Energy Solutions, 2016*)	A focus on growth and business development (corporate resilience): '*Investments and expenditures'* Climate change and resilience somewhat secondary to economic growth: *'Increase productive economic activity'* More focus on data, predictions and vulnerability assessments, especially with regards to municipal infrastructure; *'Increase survivability of infrastructure'*. General focus on protecting the private sector; *'Minimize economic loss'*
	Key Insights on Business, State and City Collaboration for a Resilient Anchorage (*Center for Climate and Energy Solutions, 2016*)	
	All Hazards Mitigation Plan Update (*Municipality of Anchorage Department of Project Management and Engineering, 2016*)	

	Risk Report – Municipality of Anchorage (*FEMA; State of Alaska Department of Commerce, Community and Economic Development; Alaska Geological and Geophysical Surveys, 2017*)	
	Anchorage Energy Landscape and Opportunity Analysis (*Municipality of Anchorage; Deerstone Consulting; Crimp Energy Consulting, 2017*)	
The Climate Action Plan & Roadmaps – Engagement, Climate Change & Resilience	Anchorage Climate Action Plan (2019)	First climate change focussed plan for the city; anticipatory: *'Prepared for the impacts of climate change'* Resilience, equity and Alaskan values as priorities: *'Inclusive community'*. Community engagement utilised, more inclusivity: *'Inclusive outreach'* No direct planning department involvement, aspirational: *'Establish proactive planning approaches'* Both adaptation and mitigation used: *'greenhouse gas inventory'* *'adaptation measures'* Academic involvement. Fragility and mainstreaming of resilience and climate action going forward.

Table 7. *Anchorage Resilience and Climate Action Planning Phaseology*

As resilience and climate action planning is a relatively recent endeavour, there is only one complete plan dedicated to climate change. Unlike in Boston (Chapter 6), Anchorage has only a limited number of planning and climate change related documents and as such, uses a phaseology that groups the plans and documents by their similarities, authors and outlooks, rather than chronology, to provide an in-depth exploration of Anchorage's resilience journey in the lead-up to, and following, the publication of the 2019 Climate Action Plan.

This analysis begins with the citywide land use plan, its more recent update, and neighbourhood-level plans, all produced by the Municipality of Anchorage. These plans provide an overview of planning in Anchorage and look at emerging approaches to addressing climate change within the city. The second phase looks at plans and reports that focus on climate change in the city produced by external actors, and tends to focus more on economic resilience. Finally, the 2019 Climate Action Plan and related 'roadmap' documents are unpacked, to investigate the most recent developments of Anchorage's ongoing resilience journey.

Table 7 above illuminates Anchorage's focus on urban development and economic growth, whilst notions of climate change action and resilience were slower to emerge. Community responsibility and inclusion, and specifically, more direct climate action grew more recently. Figure 8 is expanded upon in-depth in the second section of the chapter before concluding comments are presented and comparisons are drawn following the Boston case study in Chapter 6.

Anchorage Background and Context

Lying close to the Arctic circle, in a remote corner of the USA, Anchorage is an extreme city in an extreme environment. The city, since its inception, has faced extreme conditions such as acutely low winter temperatures, as well as unseasonably summer high temperatures. Significant snowfall is a regular occurrence, alongside nearby volcanic activity and earthquake damage. The city's remoteness, and separation from mainland America, renders the city and state heavily reliant on transport infrastructure which is often undermined by extreme weather conditions.

Figure 4. *The City of Anchorage (Anchorage Daily News, 2019)*

Figure 5. *1964 Anchorage Earthquake (Baker, 2018)*

Extreme locations also appear to cultivate extreme views. Only in 2017, did the city explicitly address climate change and resilience as a planning priority. There endures however, a conservative sentiment, across the city and state, of climate change denial, likely linked to the states' economic reliability on fossil fuels.

Misinformation and a lack of institutionalised climate action have hindered progress; however, the current urban administration is making steps to comprehensively address, and plan for, the climatic challenges facing Anchorage.

The case study area is the boundary as defined by the Municipality of Anchorage. Anchorage is a city of just under 300,000 residents; it is the largest city in the state of Alaska, which is the largest state in the USA, on the West Coast. Sitting on the coast within the Cook Inlet in the south-central area of the state, Anchorage is surrounded by sea to the South, West and North, and the mountains of Chugach State Park to the East:

Figure 6. *Anchorage from Above (Google Earth, 2019)*

The municipality of Anchorage extends to 1961.1 square miles, approximately 13% of which is water, according to the United States Census Bureau (2012). This makes it the 4th largest city in the US by land area, larger than the state of Rhode Island. The city has 38 neighbourhoods, of which 29 are located in what is locally known as the 'Anchorage Bowl', or the downtown area of the city. The remaining 9 neighbourhoods are located to the north and south of the city proper. The maps below show the outer limits of the municipality of Anchorage, and the 'Anchorage Bowl' case study area, located to the far West of the boundary:

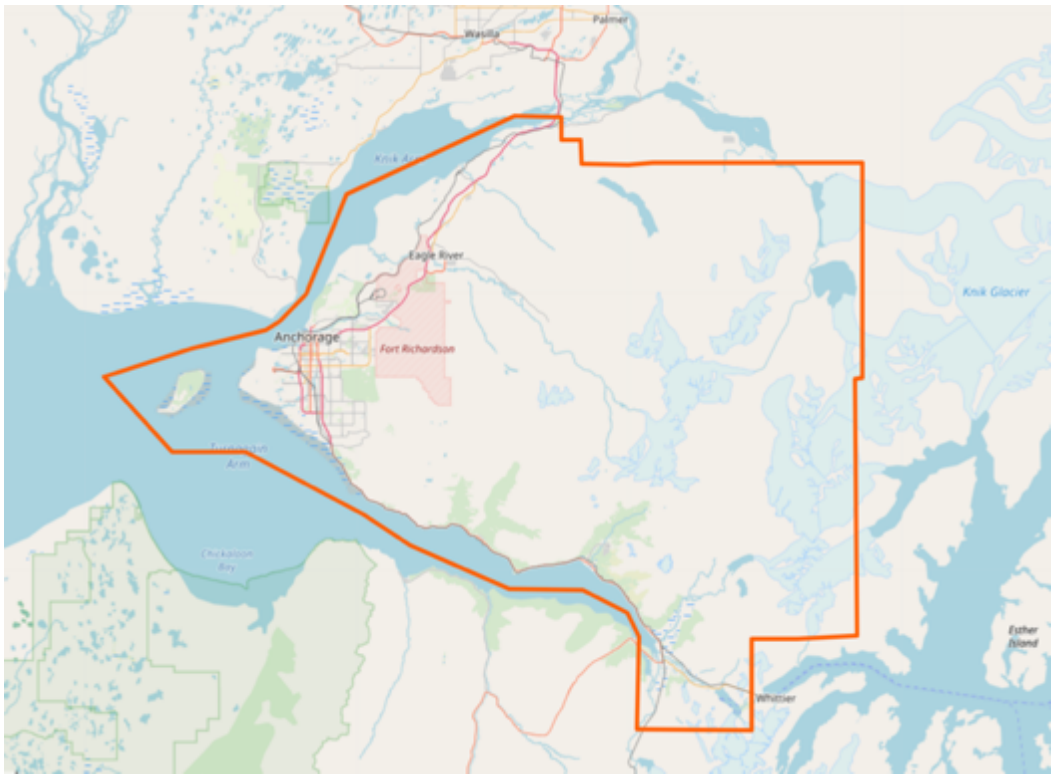


Figure 7. *City of Anchorage Boundary (Open Street Map, 2019; Anchorage Geographic Data and Information Center, 2019)*

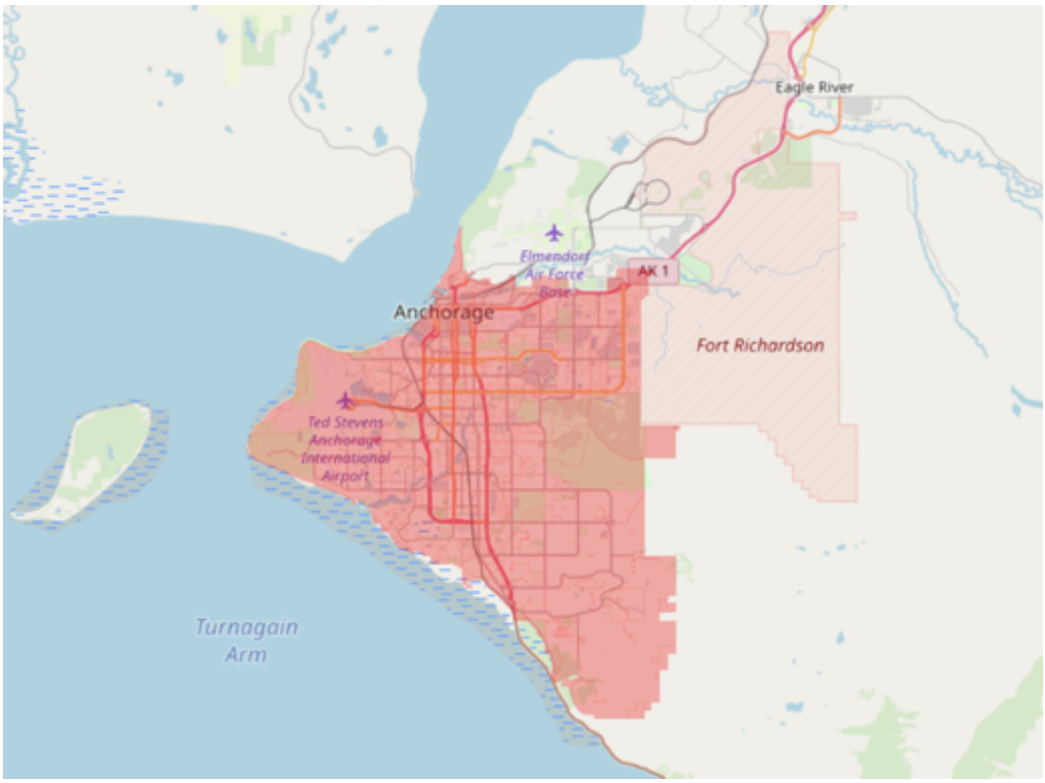


Figure 8. *Case Study Area Boundary (excluding the Fort Richardson Military Facility) (Open Street Map, 2019; Anchorage Geographic Data and Information Center, 2019)*

History and Urban Growth

The settlement patterns of the state of Alaska reflect its extreme and remote nature; ingraining within its population an adaptability to a reshaping landscape and future. Prior to Anchorage emerging as the predominant city within the state, settlements reached populations of no higher than approximately 13,000 people, due to an influx of settlers in the state as a result of the Yukon gold rush in the late 1800's. Anchorage was born ultimately by happenstance in 1914, starting as a work camp for railway workers, however growth remained slow at the beginning of the 20th century, with the population reaching only 2277 by 1930. WWII and the militarisation of the city in the 1940's increased the population, along with state-wide in-migration due to industrial decline in other Alaskan towns and cities such as Fairbanks (Hunsinger et al. 2013). WWII activities provided much of the infrastructure, such as the Alaska Highway, and population, to secure Anchorage as the biggest city within the state and the USA's most northerly urban centre. The military presence has remained crucial to Anchorage's reign, the city's strategic location during the Cold War and the incursion of military personnel during the Korean War (1950-53) ensured that the population continued to rise along with the economy.

Larger scale urbanisation in the city began at the beginning of 1960's, shortly after Alaska officially became a state in 1959, up to the 2000's, continuing until the present day. The promise of oil related jobs, the development of oil fields in the north such as Prudhoe Bay, and the construction of the trans-Alaska pipeline, encouraged in-migration, contributing to an increasingly rising urban population throughout the 1960's and 1970's. Changes to federal land management also brought an influx of government workers to the city. Following a brief economic decline in the early 1980's, the subsequent recovery in the late 1980's saw the development of billions of dollars' worth of capital projects from convention centres to new oil field developments, under the banner of 'Project 80's'. More economic success encouraged more commercial business to populate the city. Following the end of the oil boom, the city continued to grow steadily in population and area throughout the 1990's, remaining the largest urban area in the state and the centre of commercial and economic activity (Markon, 2008). In the 21st century, a continued heavy

military presence in the city, with large US Army and US Air Force bases keep the population high, along with a steady flow of in-migration from across the state and further afield (Husinger et al. 2013) Anchorage also sees a large transient population, with oil workers and big game hunters, for example, passing through the city on their way to the northern parts of the state. The population of Anchorage has grown linearly since the 1950's, as has urban sprawl, although this is beginning to reach its upper limits due to the geophysical restrictions of the area. Anchorage is predicted to continue to grow in size and population, with up to as many as 21,000 additional households predicted in the coming 25 years (Anchorage 2040, 2017). Focus has been on ensuring that planning is comprehensive enough to cope with the growth by avoiding an underestimation of urban development. In Anchorage, planning responsibilities fall under the remit of the Municipality of Anchorage.

Urban Challenges: Historic

Alaska is often referred to as the 'final frontier' of America. The state was occupied solely by indigenous peoples up until the 17th Century when the state was first colonised by European settlers from Russia. The indigenous populations were adept at coping with challenges unique to the extreme environment; changing their lifestyle, hunting practices and nomadic ways of life to adapt to the changing climate and environment. By developing a lifestyle which was flexible, with a deep understanding of the nature in which they lived, and the diversity of food sources available, they lived a generally subsistent life, adjusting their lifestyles based on continual assessments of climatic conditions (Kenny, 2017; Pearce et al., 2012). Local knowledge and tradition are characteristics upon which considerable value is put when Anchorage is faced with coping with worsening extreme conditions. This historic experience with extremes is acknowledged in a number of planning documents that are discussed later in the chapter, with 'Alaskan Values' being noted as important.

Anchorage lies exactly 198 miles south of the Arctic Circle and has a sub-Arctic climate. Its remoteness and distance from the contiguous United States are factors of its existence as an extreme environment. As such, Alaskans, and the residents of Anchorage have experience with extremes. The city can face temperatures as low as

-35°C in winter, and up to 34°C in the summer months. Furthermore, major snowfalls and infrequent volcanic eruptions from the 4 surrounding active volcanos, and subsequent ash haze and ash clouds are also historic challenges for residents of the city. Seismic activity caused by the city's location on the boundary of the North American and Pacific plate mean that earthquakes are commonplace, with major earthquakes occurring every 13 or so years. The Great Alaskan earthquake of 1964 caused notable damage to the downtown area of the city. These major extreme conditions and events are not only historic but still cause challenges in the present day. As climate change exacerbates extreme conditions, Anchorage is facing more climatic unknowns.

Urban Challenges: Current

As noted, the state of Alaska and city of Anchorage have an ongoing history of experiencing climate and weather-related shocks and stresses. Nonetheless, Anchorage, known as the gateway to America's Arctic, "is on the front lines of climate change" (C2ES, 2016). The Arctic is warming 20% faster than anywhere else on Earth (Bintanja & van der Linden, 2013), and this is impacting upon the city; in the summer of 2019, the city experienced its highest temperatures on record. The University of Alaska, Fairbanks (UAF) research group 'Scenarios Network for Alaska and Arctic Planning' (SNAP) created climate prediction models that estimated that in Anchorage, the average temperature will increase by 5°C in the next 20 years. This will have a significant impact upon rain and snowfall levels. Earlier snow, permafrost, sea ice and glacial melt, and outburst flooding will increase the overall risk of flooding and erosion, as well as limiting winter transport and recreational activities such as, snowmobiling, cross-country skiing and sled dog racing. Increased precipitation and rising sea levels may contribute to more severe coastal storms.

Warmer temperatures, whilst providing an opportunity to extend the growing season and take advantage of recreational activities, will cause a greater threat of wildfires, and insect outbreaks as summers become hotter and drier. In 2019, following the hottest summer on record, major wildfires broke out close to the city, signalling "a period of warmth that re-wrote the record books" (US National Oceanic and

Atmospheric Administration, 2019). These varying climate change effects will impact upon the built environment as well as the health and safety of the citizens of Anchorage; natural systems will also be significantly impacted.

Figure 9. *Highway damage in Anchorage after a 7.0 Magnitude Earthquake, 2018 (Anchorage Daily News, 2018)*

Figure 10. *Wildfire in East Anchorage, July 2019 (Alaska Division of Forestry, 2019)*

Beyond physical and climatic challenges, the city also deals with extremes that affect socio-economic conditions. Half of the residents of the state of Alaska reside in the city, which acts as the financial, commercial and communications capital of the state; thus, the city's location and importance economically means that the state of Alaska as a whole is heavily reliant on the resilience of Anchorage. The current political climate in the nation, and prevalence of climate change denial and misinformation is also a major concern.

Anchorage's remote location only serves to exacerbate the extreme conditions; the city is approximately equidistant between Tokyo and New York City (around a 9-hour flight from the majority of the industrialised world), and its reliance on oil poses issues. The Port of Anchorage is a crucial piece of major infrastructure for the city and state; the port's resilience has been repeatedly undermined by extreme shocks and stresses over time. The ageing infrastructure of the port means there is increased vulnerability to factors such as corrosion, tidal changes and earthquakes. Other extreme threats include strong tides and the condition of seasonal ice, both of which can significantly affect cargo ship access. Access and transport infrastructure are also undermined by extreme conditions. The state highway, Alaska Route 1, is the only road in and out of Anchorage, and a reliance on aviation across the state has the regular propensity to be jeopardised by extreme conditions such as blizzards, high wind speeds or airborne volcanic ash, making air travel difficult (C2ES, 2016).

Alaska has always been an extreme part of the world, with Anchorage serving as its societal epicentre, an innate resilience may be present to an extent, however the impacts of climate change continue to push the notion of living and thriving in an extreme urban area for residents. The challenges faced often cause significant physical damage and sometimes also result in severe financial implications; as well as affecting the supply chain to the city and the health and wellbeing of its communities. Former Mayor Berkowitz commented in 2017; "Alaskans need to do what Alaskans have always done — get ready for extreme conditions the best way they can" (Margolis, 2017).

Current Urban Form

In the present day, Anchorage is low-rise city based upon the traditional US grid system. Whilst the outer limits of the municipality are vast, the Anchorage Bowl area, where commercial, educational and residential centres are concentrated, is 100 square miles in size. Land use in the Anchorage Bowl consists of residential neighbourhoods, greenspace, civic centres, commercial corridors, transport hubs, educational campuses and industrial areas, with the military bases lying outside of the Bowl's remit.

The surrounding topography of Anchorage limits the rapacious growth and urban sprawl that can be seen in other US cities. Figure 11, The topographic map shows the slim stretch of land that Anchorage occupies between the mountains of the Chugach State Park and the waterway named the Turnagain Arm, within the Cook Inlet in the Gulf of Alaska. Figure 12 shows the official Anchorage Bowl land use map, produced by the Municipality of Anchorage.

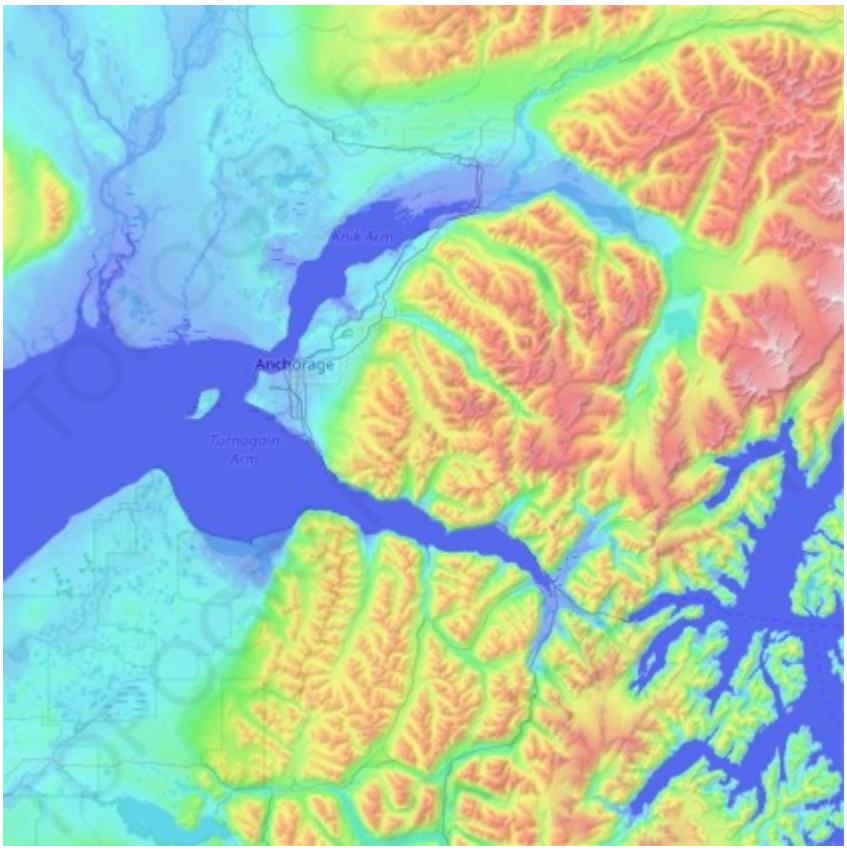


Figure 11. *Anchorage Topography (Alaska Department of Fish, 2017)*

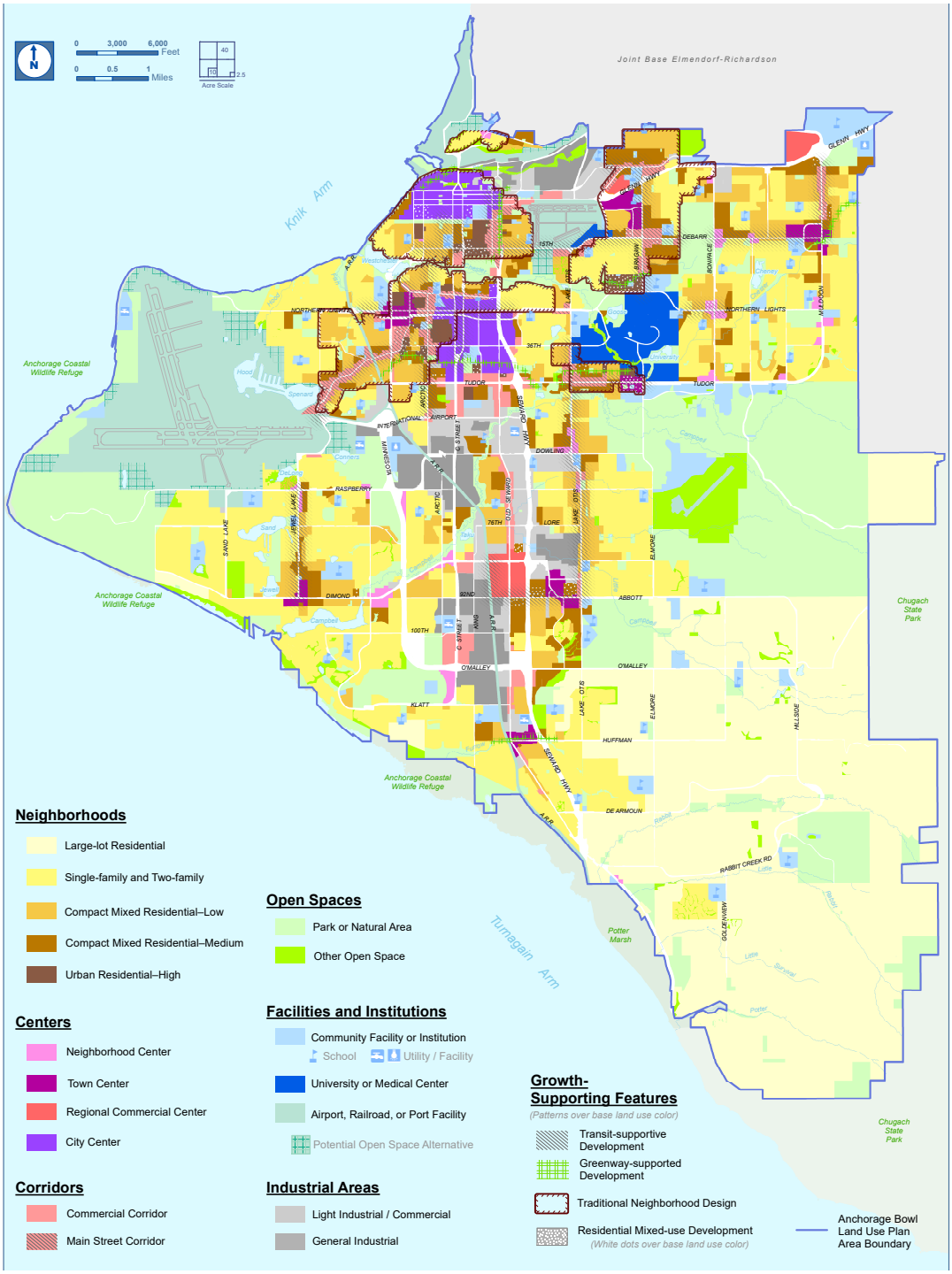


Figure 12 *Anchorage Bowl Land Use Map (MOA, 2017).*

Urban Governance

Anchorage is a consolidated city-borough, meaning the city of Anchorage has been merged with the Matanuska-Susitna Borough to form a unified and complete jurisdiction. The city is governed by an elected mayor. Between 2015 and 2020, the

mayor was Ethan Berkowitz[2] (a registered Democrat). The urban governance of Alaska also features a city manager and an 11-person assembly, all non-partisan. Politically, voters generally lean towards Republican, particularly in areas close to military bases and more suburban parts of the city; downtown area voters tend to lean towards Democrat. Anchorage representatives make up 16 out of 40 members of the Alaska House of Representatives and 8 out of 20 members of the Senate. There have been numerous efforts to make Anchorage the state capital, replacing Juneau, a smaller city in the south of the state (Berry, 2018). The Municipality of Anchorage is the local governing body for the city, overseeing municipal responsibilities such as health, transport, education and planning.

Planning Department

In terms of planning (and resilience), the Planning Department of the Municipality of Anchorage has the responsibility to: "guide Anchorage land use development and community resources to meet the quality of life, economic, social, environmental, and physical needs of present and future residents." (2019). Through the Planning Department, the city prioritises liveability, safety, health and sustainability, with an emphasis on maintaining the 'character' of Anchorage.

Within the state of Alaska, only cities and boroughs are granted land use powers and nearly half (47%) of Alaska's municipalities do not exercise any planning or zoning powers at all. Planning as a formal practice was not present in Anchorage for the first 20 years, following its establishment. From 1936 (when the City Hall was built) up until 1979, the Joint Federal-State Land Use Planning Commission for Alaska was responsible for planning decisions within the city before being disbanded; operating during a time when the state was experiencing a boom of development and change (Joint Federal-State Land Use Planning Commission for Alaska, 1979). The Alaska Chapter of the American Planning Association was established in 1980. As

[2] On 13th October 2020, Ethan Berkowitz resigned as mayor of Anchorage due to his acknowledgement of being in an inappropriate messaging relationship with a television news anchor. Austin Quinn-Davidson is the current Acting Mayor of Anchorage. The 2021 Anchorage mayoral election will still go ahead in April. As the majority of the research, and all empirical data collection, took place during the Berkowitz administration, and the Acting Mayor has made no changes to the Climate Action Plan or resilience planning process in the city, Berkowitz will be referred to as the former Mayor and discussion of administration change will still refer to the 2021 election.

such, under the current Planning Department of the Municipality of Anchorage, planning in earnest began during the 1980's, focussing on capital project development; comprehensive planning continued into the 1990's to the present day. The current Planning Department is separated into three divisions that share responsibility for planning, development and zoning:

- Current Planning
- Long-Range Planning
- Transport Planning

This study in particular focuses on the work on the Long-Range Planning Division, which oversee all comprehensive plans for the city, as well as special plans, area studies and environmental planning activities. In comparison, the Current Planning Division works at a smaller scale, providing guidance on issues such as land subdivisions, land rezoning, alcohol permits and zoning complaints. The Long-Range Planning Division (LRPD) "helps plan for community growth and development based on sound land use, urban design, economic and environmental planning principles." (2019) and has a key role in implementing city wide plans. Anchorage's current comprehensive plan is titled, '*Anchorage 2040 Land Use Plan*', adopted on 26th September 2017, as an update to its predecessor, '*Anchorage 2020 – Anchorage Bowl Comprehensive Plan*' that was adopted in 2001. In 2019, the city of Anchorage published its first *Climate Action Plan* in an effort to address pressing climatic issues that the city is facing, however the Municipal Planning Department was not comprehensively involved in its production. Climate change itself is a contentious issue within the Planning Department; a view that emerged during a fieldwork focus group with planners from the municipality, which is explored in detail below. Sea level rise and coastal erosion threatening major transport infrastructure including the Port of Alaska and the Ted Stevens Anchorage International Airport were acknowledged by planners as the main threats to the city. However, it was argued that smaller, more northerly towns such as Fairbanks are more of a priority in terms of the climate change threats they face, than Anchorage. The potential of having to deal with climate change refugees from across the state was briefly considered but beyond this, a strong link between resilience, climate

action and urban planning is insubstantial in the city of Anchorage and has yet to be mainstreamed.

The Resilience and Climate Action Journey of Anchorage

As discussed, the state of Alaska and city of Anchorage have an ongoing history of experiencing climate and weather-related shocks and stresses; ranging from wildfires to earthquakes. Ageing infrastructure and conflicting opinions on the severity of climate change further contribute to challenges that the city faces. It could be understood that with these experiences comes an inherent aptness for resilience, that has built up over time. Since Anchorage's founding in the early 20th Century, climate change has only become a municipal consideration in the more recent years. The state and city rely heavily on its petroleum and natural gas resources, which are the biggest contributors to its economy, ahead of seafood. Anchorage has begun its resilience journey in spite of climate change deniers; stepping in to fill the "climate-action void" (Rosen, 2019, p.87).

The following section will analyse the climate action and resilience 'journey' of Anchorage, and the plans that came before resilience and climate action became priorities. Resilience and climate related plans produced by the Municipality of Anchorage, and also by external stakeholders will be analysed in detail alongside discussions around specific challenges faced along the resilience journey in Anchorage. Here Table 7 from the introduction of this chapter is utilised to track the narrative throughout the planning process in the city.

Citywide Plans: Growth and Risk Management

Phase	Plans	Emphasis
Citywide & Neighbourhood-level Municipal Plans – Growth, Management & Geohazards	Anchorage 2040 Land Use Plan (2017)	A focus on growing Anchorage as a city: *'Placemaking & Growth Supporting'* Acknowledgement of protecting the environment and responding to threats (not specifically climate change): *'Geohazards management'* Neighbourhood plans introduced; acknowledgement of climate change and threats remain broad and specific planning actions are brief: *'Remain operational'* Resilience used in the 2040 plan – however specific actions for planners are still not outlined: *'Minimizing risks'* Community engagement is utilised: *'Community Resiliency'*
	Anchorage 2020 Land Use Plan (2001)	

Table 8. *Growth, Management & Geohazards*

As well as the two major citywide plans, the Municipality of Anchorage's Long-Range Planning Department lists four other comprehensive neighbourhood plans on its webpage within the Municipality of Anchorage's website:

- *Turnagain Arm Comprehensive Plan* (2009)
- *Chugiak-Eagle River Comprehensive Plan Update* (2006)
- *Girdwood Area Plan* (1995)
- *Chugiak-Eagle River Comprehensive Plan* (1993*)*

This study has also included the following plan:

- *Destination Downtown: Anchorage Downtown Comprehensive Plan* (2007)

For the purpose of this study, comprehensive analysis of the plans began at the beginning of the 21st Century and focussed mainly on the two city-wide plans, the 2020 and 2040 Plans as Anchorage has fewer climate and resilience related plans than its counterpart Boston. Analysis of the plans below is presented chronologically, however analysis and discussion of the process that was undertaken to produce the *2019 Climate Action Plan* is also interwoven throughout, in relation to the other municipal plans.

Anchorage 2020 – Anchorage Bowl Comprehensive Plan

The *Anchorage 2020 – Anchorage Bowl Comprehensive Plan* (ABCP), published in 2001, was the first time the city had had a plan covering the entire urban area, rather than being neighbourhood or area focussed. As Anchorage prepared to enter the 21st century, the focus was on urban growth. Whilst an awareness of the environment was present, this was manifested mainly in relation to environmental protection, rather than addressing any climate or 'extreme' related concerns. As Anchorage, in 2001, was still a 'new city' in the relative history of the state and country, priorities were centred around urban and economic development, whilst creating harmonious communities to become a "true northern/winter city" (ABCP, 2001, p.37). As most of the sustainable land in Anchorage was already built upon, according to the document, this remained a key consideration of how Anchorage should grow. The plan prioritised 'harmony with nature' in relation to climate planning, but again, more focus was put upon planning for the protection of the environment rather than climate change; avoiding growth and development in 'sensitive areas' and protecting biodiversity constituted the focus of environmental planning. There was a focus on urban growth with examples of scenario planning; projections for Anchorage to grow in the coming 20 years are presented alongside broader aspirations for safe neighbourhoods, economic growth, improved quality of life and mindfulness of the natural environment. Little mention of planning for resilience and climate risk in the broader picture, is evident. Furthermore, resilience as a specific phrase is not used at all; climate change as a phrase is also not used. In relation to the extreme nature of the city, natural hazards are discussed as a threat, to be managed through public policy, emergency plans and educational programmes to minimize risk. In terms of hazards, 'geohazards management' is used when discussing minimising the risk that

the city faces, reflecting the 'safe growth' movement promoted by the American Planning Association at the time, who encouraged cities to focus on minimising the impacts specifically of natural hazards:

> "With Anchorage's diminishing land supply, development over the life of this plan will emphasize redevelopment and place increasing pressure on remaining vacant lands. Some of the residual parcels and redevelopment target areas lie within identified geohazard zones. The Municipality and the development community should address these geohazards in order to minimize risk and damage potentials... The need for new and/or revised policies for regulatory development guidelines in Anchorage's geohazard areas should also be evaluated." (ABCP, 2001, p.97).

This acknowledgement of geohazards indicates the first time that the Municipality considered extreme threats within a planning context. Only within three policies in the plan are hazards or the climate explicitly acknowledged:

> " New rural residential subdivisions shall be designed to…
>
> a) Protect, maintain, or avoid sensitive environmental areas…
> b) Incorporate wildland fire safety design standards." (p.73).
>
> "Land use regulations shall include new design requirements that are responsive to Anchorage's climate and natural setting." (p.81).
>
> "The Municipality shall minimize the incidence of new development for human occupancy in high natural hazard areas." (p.86).

These policies contain the following strategies for implementation based around:

- "Design standards
- Land use regulation
- Development guidelines; and,
- Hazard management" (p.69).

The 2020 plan was updated in 2017, 16 years after its initial publication. During this time, two neighbourhood plans were published (as mentioned above). The *'Chugiak-Eagle River Comprehensive Plan Update'* (2006) and '*Turnagain Arm Comprehensive Plan'* (2009) planning documents both acknowledge the extreme conditions of the city such as heavy snow and natural hazards and suggest climate-responsive design, but do not explicitly discuss climate change or resilience in terms of planning, beyond suggesting that environmentally sensitive areas require additional protection. In addition, the '*Destination Downtown: Anchorage Comprehensive Plan*', produced by the Planning Department in 2007 follows a similar outlook. The 2007 *Anchorage Coastal Management Plan*, also produced by the Planning Department, has no mention of climate change. Hazards such as flooding, storms and coastal erosion are discussed, particularly in relation to avoiding building in at-risk areas; emphasis is also put upon how human activity can co-exist with the natural environment, again focussing on protection. The plan suggests that city planners are working to integrate coastal management initiatives into local planning policy, however, there has not been an update since 2007.

Anchorage 2040 Land Use Plan

Published in 2017, the *Anchorage 2040 Land Use Plan* (ALUP) is the update of the 2020 version; this plan is also deemed a 'living document'. It builds upon the 2020 version of the plan and there is still a focus on growth, land capacity and community composition. In this version there is an increased emphasis on investment and growth in the city. Here, resilience enters the planning lexicon in Anchorage; the concepts of resilient growth and community resiliency emerged since the publication of the 2020 version of the plan, although like the original plan, the 2040 update still focusses on natural hazards as the key climatic threat to the city. Community resilience is a frequently mentioned concept that did not previously appear in the 2001 version of the plan. Whilst the term is at no point explicitly defined, it is used within the context of self-sufficiency and the capacity for citizens to respond to the impacts of climate change. Community involvement within resilience has long been a social concept and is utilised comprehensively throughout Anchorage's resilience related plans and initiatives.

The concept of resilience, as previously mentioned, was stated to be 'infused' throughout the plan and centred around minimizing the risk of exposure to natural hazards and increasing residents' safety:

> "Goal 1 – Plan for Growth & Liveability: Anchorage achieves residential and commercial growth, which improves community resiliency and citizens' quality of life as it supports their vision for the future expressed in the Comprehensive Plan." (p.16)

In this plan, according to the Planning Department, sustainable economic development also falls under the umbrella of the Municipality of Anchorage's 2017 version of 'resiliency', which encompasses infrastructure, community and the economy. Nonetheless, during a focus group with municipal planners, it was stated that planning as a tool for building urban resilience is "*not really a concept"* within the Planning Department and was *"shoehorned into the 2040 Land Use Plan"*. This follows a pattern amongst the planning department that sees resilience and climate change as an afterthought or aside to their day-to-day jobs. Indeed, resilience is at no point explicitly defined in the 2040 Plan, although it could be deduced that a 'bounce-back' interpretation of the term was used:

> "Resiliency includes minimizing residents' exposure to risks from natural or man-made hazards. It also supports municipal initiatives that increase energy efficiency, public safety, and lasting economic development, pending a future revision to the Comprehensive Plan." (p.16)

> "Planning and development of these facilities should account for resiliency to natural hazards, including the need to remain operational following seismic events." (p.54).

The need for resilience in the 2040 plan emerged as a result of increased community involvement and consultation:

> "[Concerns] included community resiliency in relation to natural hazards and other disasters, energy efficiency, urban agriculture and food security, economic uncertainties, climate changes, and other shocks and stresses." (p.16).

The equivocal nature of resilience is evident in its use throughout the 2040 plan; indicative of its moniker as a 'buzzword' with a debatative definition. The inclusion of resilience in relation to climate change within the plan is tenuous. Again, following the focus group with the planning department, the overwhelming attitude appeared to mirror much of the state and federal level views, to be that of disinterest and disengagement when addressing climate change as the state and city is highly reliant on the oil industry as a source of income. In the opinion of the planners, "*Anchorage has not experienced any major climate change related shocks [or stresses]*"; therefore, climate action and resilience simply aren't priorities. A number of planners admitted that the longer, hotter summers are beneficial; "*more time to barbecue"*, and climate change "*didn't seem so bad*" (planner in the focus group).

In the 122-page planning document, page 16 sees the singular mention of climate change. The planning narrative at this point appeared to still focus on hazards and disasters rather than an overall changing climate, seismic hazards being the key worry. The lack of specific climate change related focus may be reflective of the thinly veiled aversion to accepting climate change as a legitimate, anthropogenically exacerbated threat to Alaska and the city of Anchorage.

The 2040 plan was formulated in anticipation of continued urban growth in the city, another focus being (sustainable) economic growth, the driver for urban development in Anchorage. The growth and development focus is cemented by Hal H. Hart, former director of Long-Range Planning for the Municipality, who, in a letter to the residents of the city, signs off by assuring them that; "Anchorage is open for investment and new ideas!" (p.0). Research has shown that urban growth can exacerbate the impacts of climate change, and this can be found particularly true in extreme cities such as Anchorage (Zhao, 2018; Revi et al. 2014). However, it is clear that, at least until 2040, Anchorage is pursuing intensive growth, and planning efforts are being directed to development in lieu of balancing urban growth with

climate action and resilience planning. Despite resilience being mentioned a number of times in the plan, no specific goals utilise the word, rendering it passive within the planning narrative.

The *Anchorage 2040 Land Use Plan* evidences the Municipality of Anchorage's Planning Department's priorities, which are continued urban growth and economic development for the city. The threats of climate change and the concept of planning for resilience and climate action are, to an extent, neglected by the planners, appearing as an afterthought leading to somewhat of an impasse. Prior to the publication of the *Climate Action Plan* in May 2019, five other city-based documents were published, that relate to climate change action and resilience, but were not produced by the Municipality of Anchorage Planning Department. These plans are now explored in the following section, to understand their influence, if any, on climate action and resilience planning in Anchorage. No evidence was found that any of the upcoming plans were used in either the 2001 or 2017 update of the *Land Use Plan* or accompanying neighbourhood level plans that have just been analysed.

Non-Planning Department/Municipality of Anchorage Plans

Phase	Plans	Emphasis
Non-Planning/ Municipality Climate Plans – Disconnect, Business & Economic Growth	Climate Change Impacts in Anchorage (*Center for Climate and Energy Solutions, 2016*)	A focus on growth and business development (corporate resilience: '*Investments and expenditures'* Climate change and resilience somewhat secondary to economic growth: *'Increase productive economic activity'* More focus on data, predictions and vulnerability assessments, especially with regards to municipal infrastructure; *'Increase survivability of infrastructure'*. General focus on protecting the private sector; *'Minimize economic loss'*
	Key Insights on Business, State and City Collaboration for a Resilient Anchorage (*Center for Climate and Energy Solutions, 2016*)	
	All Hazards Mitigation Plan Update (*Municipality of Anchorage Department of Project Management and Engineering, 2016*)	
	Risk Report – Municipality of Anchorage (*FEMA; State of Alaska Department of Commerce, Community and Economic Development; Alaska Geological and Geophysical Surveys, 2017*)	
	Anchorage Energy Landscape and Opportunity Analysis (*Municipality of Anchorage; Deerstone Consulting; Crimp Energy Consulting, 2017*)	

Table 9. *Disconnect, Business & Economic Growth*

From reading and analysing these plans, a general theme of economic resilience can be drawn, focussing on a bounce-back approach in the face of any economic uncertainties. Climate change and related challenges generally appear as a much

lower priority in these documents. The *Climate Change Impacts in Anchorage* (2016) and *Key Insights on Business, State and City Collaboration for a Resilient Anchorage* (2016) reports were both produced by the Center for Climate and Energy Solutions (C2ES), a non-profit based in Virginia, USA. During fieldwork interviews with various stakeholders involved in climate planning in Anchorage, none were aware of the two reports, and further inquiry cannot determine the exact use of the reports. The *Key Insights* report features once under the 'Related Municipal and Community Plans and Reports' section in the *2019 Anchorage Climate Action Plan* but is not commented on in any meaningful way. The report is also referred to in FEMA's 2016 *Risk Report – Municipality of Anchorage* (discussed below), where outcomes of the document are built upon. The reports were the outcome of

> "a two-day Solutions Forum workshop in March 2016 in Anchorage, Alaska, focusing on opportunities for collaboration in building a climate-resilient Anchorage where approximately 50 business leaders, city, state, federal and tribal officials, non-profit organizations, and other experts shared their experiences of addressing climate change impacts and enhancing resilience. Discussion focussed on the role each stakeholder group can play in planning for resilience." (p.1).

The two reports identify the threats that the city is facing and take an economically grounded approach to resilience; focussing on incorporating resilience and risk preparedness within the city to reduce any potential costs that may be faced. Suggestions from the *Key Insights on Business, State and City Collaboration for a Resilient Anchorage* (2016) document centre on business and financial resiliency:

- "Risk management and emergency management plans help businesses prepare for events, along with drills and training exercises with employees." (p.2)

- "private stakeholders can think holistically about how investments and expenditures can provide the greatest benefit for least-cost…if a locality is replacing port infrastructure, it should incorporate sea level rise projections to ensure the resilience of the port as conditions change." (p.3)

Following a similar theme to the 2020 and 2040 Plans, the two reports ultimately appear to focus on building and attracting more businesses and investment into the city, under an overarching resilience theme. Here, the notion of 'corporate resilience' can be found in the city context; linking to ideas in Chapter 3 regarding the prioritisation of profit over true resilience, as a "governance agenda in resilience clothing" (Leitner et al. 2018, p.2). The FEMA *Risk Report* does however work to support the findings and further promote resilience.

The *Anchorage Energy Landscape and Opportunity Analysis* (2017) is economically focussed, with acknowledgements of climate change and resiliency. Produced; "as a pro-active response to economic headwinds driven by low oil prices, declining production and reduced state revenues, this assessment aims to facilitate and increase productive economic activity; save the MOA, residents and businesses energy and money; enhance local resiliency; and mitigate climate change impacts." (p.ix), the document is primarily a technical report analysing the potential for cleaner, more efficient energy production in the state and city. The role of planning is only discussed in relation to transport planning for more efficient bus and rail routes as well as, "effective land use planning that facilitates desirable energy-related outcomes, such as more walkable communities and strategic placement of EV charging stations" (p.67).

The *All Hazards Mitigation Plan Update* (2016), was produced in compliance with federal and state hazard mitigation planning. An 'Anchorage Hazard Mitigation Planning Team' was comprised to produce the plan and included stakeholders such as the Office of Emergency Management, Project Management & Engineering, Maintenance & Operations and the Anchorage School District, although surprisingly not the Municipality's Planning Department; highlighting the disconnect between day-to-day planning and specific emergency planning or response efforts. When inquired about this during the focus group, the majority of planners were not aware of the report. The following hazards were identified as principal 'extreme' threats to the city:

Natural	Technological
Earthquake	*Dam Failure*
Wildfire	*Energy Emergency*
Flooding	*Hazardous Materials Release*
Avalanche	*Dock Failure*
Ground Failure/Landslide	*Transportation Accident*
Severe Erosion	*Communications Failure*
Extreme Weather	*Urban Fire*

Table 10. *Anchorage Principal Hazards (adapted from: All Hazards Mitigation Plan Update, 2016)*

This plan is another 'living document', intended to be updated every 5 years, particularly in the aftermath of any of the aforementioned hazards. Currently, (December 2020), there is no evidence that an update is being worked on in order to be released in 2021. Resiliency is utilised throughout the document and appears to still be based upon the 'bounce-back' interpretation of the term. Specifically, Goals 3 and 4 place emphasis on resilience:

- "Goal 3: Increase the survivability and resiliency of municipal structures and functions for local hazards…

- Goal 4: Improve the resiliency of essential private sector functions" (p.111).

Despite the Planning Department not having first-hand involvement in the production of the plan, planning as a tool for hazard mitigation is employed within the plan. It is suggested that a useful imperative would result in land-use planning regulation being developed to reduce hazard risk to the urban population, by also enforcing public policies. Under the implementations section, planning appears as a key strategy:

> "Land use planning can guide development away from hazard-prone areas. Planning is more effective at protecting future development. The responsibility for land use planning is with the Planning and Development Services Department." (p.112)

Whilst the burden is passed to the planning department, there is no more detail provided regarding the specifics of what planners must do beyond using zoning to regulate development in particularly hazard prone areas; a theme that is present in previously discussed documents. This was brought up in the focus group with the municipal planners for Anchorage, who noted the disconnect between the expectations of planners and their actions. Siloed working was identified as an issue that planners were "*working on"*. Furthermore, in an interview with an academic who served on the steering committee, it was suggested that the Department of Emergency Preparedness within the Municipality (responsible for the *Hazard Mitigation Plan*), focussed retroactively on threats that had already occurred and "*focus little, if at all, on future, unknown threats that could occur as a result of climate change"*. The disjointed approach to climate action and planning for resilience has seemed to continue as a theme throughout the CAP production process and the overall resilience journey in Anchorage.

The *Risk Report – Municipality of Anchorage* (2017) was published by FEMA, along with the State of Alaska Department of Commerce, Community and Economic Development and the Alaska Geological and Geophysical Surveys. The report was not produced in partnership with the Municipality of Anchorage but takes note of existing municipal plans to ensure that any recommendations are consistent with existing documents and initiatives. The *Risk Report* lists two main goals:

> "(1) inform communities of their risks related to natural hazards; and
>
> (2) enable communities to take action to reduce their risks. State and local officials can use the data provided here to update local plans, communicate risk, inform modifications to development standards, identify mitigation projects, and ultimately take action to reduce risk" (p.1).

The *Risk Report* is also mentioned briefly in the *2019 Climate Action Plan*, but not discussed in any way. The comprehensive report covers the physical and socio-economic impacts of hazards and risks faced by the city; a result of an in-depth risk assessment carried out by FEMA. Community planners are listed as one of the 'intended audience' and planning is covered within the context of building codes, however when interviewed, the planners themselves were unaware of this intention. It is stated that urban resilience was being undermined by a lack of suitable city codes, and that updating building codes could be used as a "general planning tool" (p.33). Furthermore, land-use planning is mentioned in terms of integrating the findings of the report into practice, as well as to help achieve the aims of the FEMA-produced *Anchorage Hazard Mitigation Plan* (HMP) (2016), discussed above:

> "Within land-use planning, local officials could use the data/information in this Risk Report and the HMP to update elements of the comprehensive plan, such as existing conditions, community history, future land use, conservation and natural resources, public facilities/services, transportation, housing, historic preservation, economic development, recreation and open space, and public safety." (p.49).

Recommended resilience strategies are included in the report; designed to be "as consistent as possible with the existing planning mechanism" (p.50). Strategy 1 focusses on resilience and is supported by the climate models produced by FEMA. A comment in the report again suggests incorporating proposals into already existing municipal documents but does acknowledge that funding is limited, particularly at the federal level.

The *Risk Report* notes the use and integration of data as an important tool to update plans. Available data has been an obstacle along Anchorage's resilience planning journey, particularly when the latest *Climate Action Plan* was being researched and prepared. More broadly, knowledge gaps emerged as a hindrance identified by a number of interviewees. A dearth of planning expertise, and overall knowledge gaps emerged repeatedly throughout fieldwork interviews as major roadblocks along the resilience building and CAP writing process. A lack of tangible data, particularly at a granular level, also caused issues. Whilst climate projection data is available in the

CAP, neither the municipality itself, nor the University of Anchorage, Alaska, had their own data. Furthermore, regarding emissions data, an interviewee from the Mayor's office noted that no emissions data is available and as such, "*there are no numerical projections in the plan*". An academic who served on the steering committee concurred in an interview, regarding the lack of data; whilst the threats that Anchorage is likely to face as a result of climate change are known, "*the research and data to more accurately predict the impacts is missing"*. The interviewee commented that firstly, the exact type of monitoring required must be identified before systems are set up to carry out the monitoring, furthermore they added; "*the municipality does not want to be in control of this*.", likely due to the burdens this would put upon time and resources, as well as the omnipresent notion that climate change is not considered a legitimate threat to the city.

The above documents all contributed to Anchorage's resilience journey and road to comprehensively addressing climate change in the city, although their influence is at times vague. The obstacle of climate change denial and disinterest has percolated through layers of governance and permeated citizen opinion alike. Beyond this, a disconnect between documents has mired any attempts to straightforwardly address climatic issues in the city; there is an overall lack of cohesion between stakeholders and a slight randomness regarding the production of certain documents. Attempts during the fieldwork to answer questions (set out in Chapter 4) such as, '*why was this document produced?*' or, '*how is this document used?*' were received with unawareness or vague answers, leading to a certain amount of frustration and dissatisfaction when attempting to delve into Anchorage's ongoing resilience journey. This could be attributed to the pervasive disinterest in climate change as a threat, particularly when the trade-off is a longer BBQ season. Furthermore, the tussle between the desire to address climate change and the desire to grow and develop Anchorage as a metropolitan area serves to add to the conflict and disconnect being experienced in the city.

The *Anchorage Climate Action Plan* in 2019 was an opportunity for the city to address the threats the city faces, in a document solely produced for that purpose. The following section discusses the plan in detail, including its ad-hoc approach, and most starkly, the omission of a professional planning presence.

The 2019 Climate Action Plan

Phase	Plans	Emphasis
The Climate Action Plan & Roadmaps – Engagement, Climate Change & Resilience	Anchorage Climate Action Plan (2019)	First climate change focussed plan for the city; anticipatory: *'Prepared for the impacts of climate change'* Resilience, equity and Alaskan values as priorities: *'Inclusive community'*. Community engagement utilised, more inclusivity: *'Inclusive outreach'* No direct planning department involvement, aspirational: *'Establish proactive planning approaches'* Both adaptation and mitigation used: *'greenhouse gas inventory'* *'adaptation measures'* Academic involvement. Fragility and mainstreaming of resilience and climate action going forward.

Table 11. *Engagement, Climate Change and Resilience*

Nearly 10 years after the initial attempt to publish a climate action plan, the Municipality of Anchorage, along with a multiplicity of stakeholders worked to develop a resilience strategy and build Anchorage's urban resilience through urban planning and related built environment professions. This, rather unprecedently occurred over a one-year period between 2018 and 2019. The publication of the *Anchorage Climate Action Plan* (CAP) in May 2019 was the culmination of municipal efforts to prepare the city for change in the face of an uncertain future; resiliency is said to be 'infused' throughout the goals, polices, strategies and actions (interview with a member of the CAP steering committee).

Roadmaps

As discussed beforehand, the 2019 CAP was influenced by the two roadmaps; *Welcoming Anchorage Roadmap* (WAR) and *Resilient Anchorage Roadmap* (RAR), produced in 2017 as part of the 'Anchorage: Welcoming and Resilient' Initiative, driven by former Mayor Berkowitz. According to a leading member of the Berkowitz administration, these two documents provided the initial ideas and values that shaped the CAP and pioneered resilience in the city.

Together the two roadmaps form companion documents, designed as 'living documents' to identify required changes to policy and serve as an "action-oriented strategic integration plan" (WAR, 2017, p.1). A key theme running through both documents puts Alaskan 'values' at the forefront. Words such as 'inclusivity', 'justice', 'respect' and 'transparency' are used often. A source close to the Mayor commented during an interview that, *"[above all], equality is at the heart of resiliency for Anchorage"*. The mayor himself commented in an interview with the Anchorage Daily News, his intention to address the concerns of all citizens; "In Anchorage we seek to reach out to all and get them prepared for shocks and opportunities" (ADN, 2019).

In the RAR, climate change is considered, particularly in relation to 'emergency preparedness' and 'climate readiness'. The theme of equity is embedded throughout both roadmaps, particularly in relation to community engagement. A 'shared vision' is identified as a goal in an attempt to promote inclusivity within the population of Anchorage. Furthermore, the historic aptitude of Alaskans to cope with climate adversity is also acknowledged under the 'Alaskan values' banner, hinting at the role a city's extreme experience plays in its reaction to upcoming threats. In terms of urban planning for resilience in Anchorage, the RAR but not the WAR, introduces the concept on a broad level. 'Climate action planning' and 'emergency planning' are each mentioned once, but not expanded on in any way, leaving the interpretation vague. It is not clear if 'planning' is related to the specific profession or a more ambiguous definition. Following these Roadmaps came the full Climate Action Plan, which expanded on some of the visions within the WAR and RAR to create a comprehensive approach to addressing climate action challenges in Anchorage.

The Climate Action Planning Process

The *Anchorage Climate Action Plan* was prepared to respond to the rising threat of climate change threatening the city. An aide of the Mayor stated that, "*whilst Anchorage has yet to suffer any cataclysmic events caused by climate change, the CAP acknowledges the rapid rate at which the climate is changing in the state and city, more so than in the contiguous United States*". As a result, the CAP intends to implement comprehensive adaptation efforts to ensure the city is protected; it is estimated that without this, the cost of damage could total almost $5.5 billion by 2100. Furthermore, the threat to infrastructure is particularly concerning as the city serves as a transportation hub for the state, as well as being the basis for economic and supply chain activity for Alaska. If the port is rendered inoperative, it would cause impacts that would be felt across Alaska. An increased risk of wildfires, freeze-thaw weathering, and unpredictable salmon fishing conditions also constitute major threats to the city and are challenges that CAP stakeholders considered.
The timing of the Anchorage Climate Action Plan was somewhat serendipitous, described by an interviewee from the Mayor's Office of Anchorage, as taking advantage of a window of opportunity. The interviewee noted the rapid pace at which the plan was put together; this was thought to be, in part, as a result of former Mayor Berkowitz's ardour to address the climatic concerns of the city and thus produce and implement a plan as soon as possible. Additionally, following his re-election, it would be the final opportunity for the Mayor to push his climate action agenda from a unique position of power. A key academic stakeholder described the overall process of creating the plan as "*a little ad-hoc*". One academic involved in the plan briefly broke down the initial process that led to production of the CAP. The first stage of the planning process saw working groups created, and headed by academics from the University of Alaska, Anchorage (UAA) or municipal employees; these groups were based upon the seven sectors that appear in the plan discussed above. Academics were heavily involved from the outset and worked closely with those based in the Mayor's Office throughout; partly due to the $80,000 grant that UAA acquired from the Faculty Initiative Fund to help fund the CAP project and plan. The working groups were formed based upon the various priorities the city identified, as well as the expertise of the stakeholders that were involved. In

response to the comments about the abolition of the state-wide initiative, 'Climate Action for Alaska Leadership Team', the academic member of the steering committee confirmed that the plan is focussed "*firmly at the municipal level*", with close ties to the university. The university itself runs an initiative named Resilient Communities, with the aim of fostering community resiliency through a strengthened town-gown relationship. Inspiration for the CAP was drawn from examples from other cities, which helped provide background to the climate action and resilience planning process and begin to fill in some knowledge gaps. In particular, the 2015 *Portland Climate Action Plan* and the 2018 *80x50 Denver Climate Action Plan* were relied upon, to help decide priorities and focus points. According to an interviewee from the Mayor's Office, this was due to the cities having "*similar equity values"*.

The *Climate Action Plan* builds on the two roadmaps and emphasises Anchorage's "deeply rooted Alaskan traditions of collaboration and innovation" (p.3). The socio-economic and physical impacts of climate change are addressed simultaneously in an effort to both mitigate and adapt to climatic changes. Furthermore, the actions proposed also intend to benefit residents, for example, by creating jobs and improving equality in the city. A letter to residents, from former Mayor Ethan Berkowitz specifically acknowledges the Dena'ina Athabascan First Nation citizens, upon whose land the city lies. The letter stipulates that the Municipality of Anchorage and in particular, the CAP, respects that the indigenous knowledge and values are foundational to building resilience in the city.

A bold vision is presented at the start of the plan:

> "In 2050, Anchorage is a resilient, equitable, and inclusive community prepared for the impacts of a changing climate. Winter cities around the world look to Anchorage as a leader in stewardship and energy innovation. Anchorage is self-sufficient and the heart of our state's globally competitive economy." (p.4).

In an effort to achieve this goal; the plan was produced by a range of stakeholders divided into working groups, alongside an overarching steering committee and advisory committee. Many community members also volunteered throughout the

process. Focussing on the theme of Alaskan values that stakeholder interviewees and planning documents have prioritised, a considerable amount of public engagement was undertaken throughout Anchorage's (ongoing) resilience journey. An advisor to former Mayor Berkowitz recognised the power of public engagement in relation to strengthening resilience in the city, commenting that seeing the city take the initiative and responsibility to address climate change has encouraged residents to react positively and take ownership alongside the Municipality.

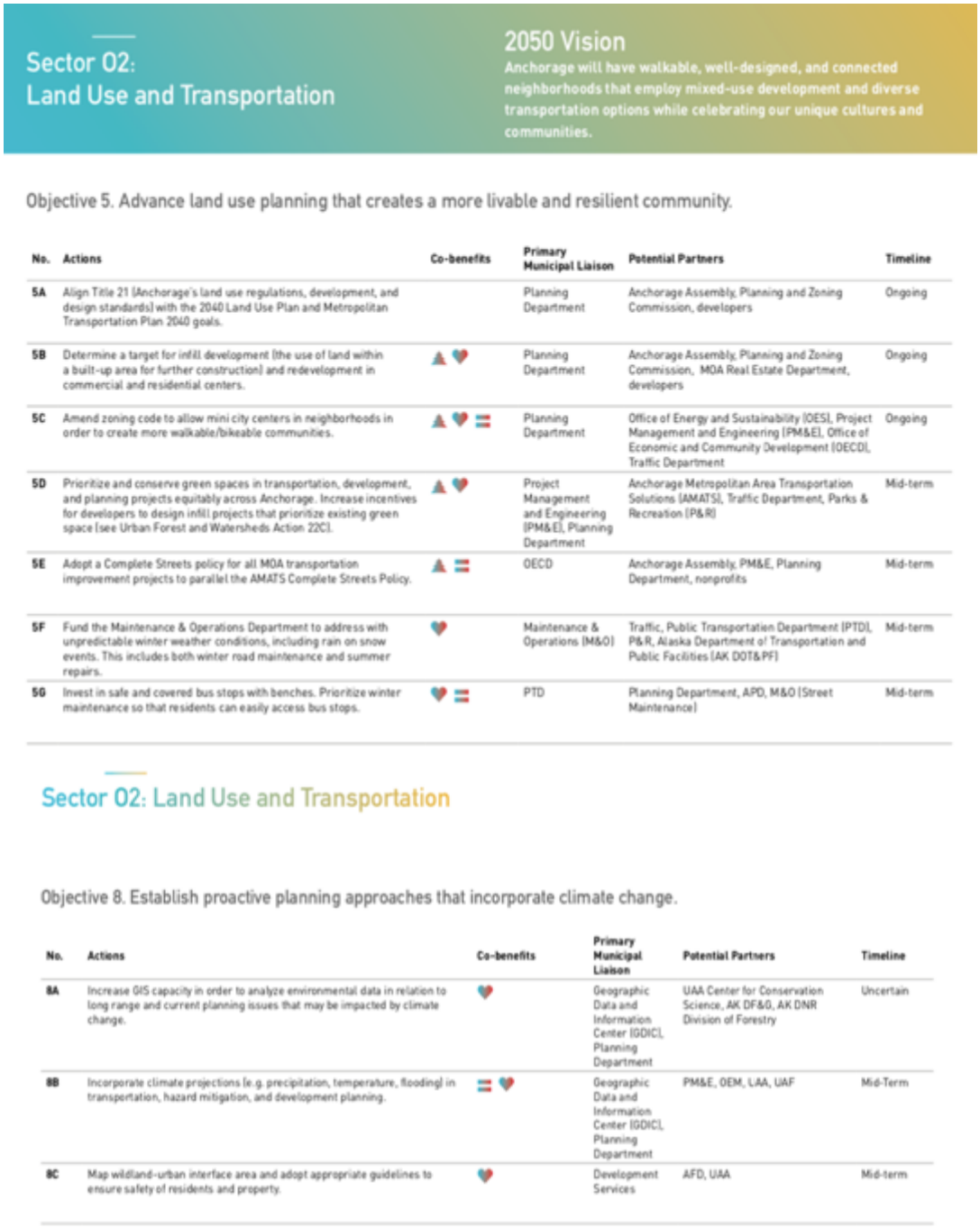
The plan's primary action regarding climate change focusses on reducing greenhouse gas emissions by 80% from 2008 levels, by the target year of 2050; tackling climate change at its root as well as addressing the increasing effects. There are two overarching climate actions set out by the plan:

1. "Complete a greenhouse gas inventory and update annually to measure progress towards climate goals.
2. Develop a framework for selecting, monitoring, and sharing indicators that track 1) environmental changes associated with climate change, 2) impacts of climate change at a neighborhood- level, and 3) adaptation measures and their effectiveness in Anchorage." (p.9).

The plan is then divided into seven sectors:

- Buildings and Energy
- Land Use and Transportation
- Consumption and Solid Waste
- Health and Emergency Preparedness,
- Urban Forest and Watersheds
- Outreach and Education.

Each sector contains a 2050 vision, and interim objectives for 2030 with 'action steps to facilitate achieving these goals:



Sector 02: Land Use and Transportation

2050 Vision

Anchorage will have walkable, well-designed, and connected neighborhoods that employ mixed-use development and diverse transportation options while celebrating our unique cultures and communities.

Objective 5. Advance land use planning that creates a more livable and resilient community.

No.	Actions	Co-benefits	Primary Municipal Liaison	Potential Partners	Timeline
5A	Align Title 21 (Anchorage's land use regulations, development, and design standards) with the 2040 Land Use Plan and Metropolitan Transportation Plan 2040 goals.		Planning Department	Anchorage Assembly, Planning and Zoning Commission, developers	Ongoing
5B	Determine a target for infill development (the use of land within a built-up area for further construction) and redevelopment in commercial and residential centers.		Planning Department	Anchorage Assembly, Planning and Zoning Commission, MOA Real Estate Department, developers	Ongoing
5C	Amend zoning code to allow mini city centers in neighborhoods in order to create more walkable/bikeable communities.		Planning Department	Office of Energy and Sustainability (OES), Project Management and Engineering (PM&E), Office of Economic and Community Development (OECD), Traffic Department	Ongoing
5D	Prioritize and conserve green spaces in transportation, development, and planning projects equitably across Anchorage. Increase incentives for developers to design infill projects that prioritize existing green space (see Urban Forest and Watersheds Action 22C).		Project Management and Engineering (PM&E), Planning Department	Anchorage Metropolitan Area Transportation Solutions (AMATS), Traffic Department, Parks & Recreation (P&R)	Mid-term
5E	Adopt a Complete Streets policy for all MOA transportation improvement projects to parallel the AMATS Complete Streets Policy.		OECD	Anchorage Assembly, PM&E, Planning Department, nonprofits	Mid-term
5F	Fund the Maintenance & Operations Department to address with unpredictable winter weather conditions, including rain on snow events. This includes both winter road maintenance and summer repairs.		Maintenance & Operations (M&O)	Traffic, Public Transportation Department (PTD), P&R, Alaska Department of Transportation and Public Facilities (AK DOT&PF)	Mid-term
5G	Invest in safe and covered bus stops with benches. Prioritize winter maintenance so that residents can easily access bus stops.		PTD	Planning Department, APD, M&O (Street Maintenance)	Mid-term

Sector 02: Land Use and Transportation

Objective 8. Establish proactive planning approaches that incorporate climate change.

No.	Actions	Co-benefits	Primary Municipal Liaison	Potential Partners	Timeline
8A	Increase GIS capacity in order to analyze environmental data in relation to long range and current planning issues that may be impacted by climate change.		Geographic Data and Information Center (GDIC), Planning Department	UAA Center for Conservation Science, AK DF&G, AK DNR Division of Forestry	Uncertain
8B	Incorporate climate projections (e.g. precipitation, temperature, flooding) in transportation, hazard mitigation, and development planning.		Geographic Data and Information Center (GDIC), Planning Department	PM&E, OEM, UAA, UAF	Mid-Term
8C	Map wildland-urban interface area and adopt appropriate guidelines to ensure safety of residents and property.		Development Services	AFD, UAA	Mid-term

Figure 13. *Objectives 5 & 8 – Land Use & Transportation (Anchorage Climate Action Plan, 2019)*

Most of the actions stated above are equivocal in nature; potentialities and suggestions rather than more substantial and tangible planning actions, with insufficient implementation and monitoring information available. Definitive projects outlined in the plan remained at a smaller scale. For example, the 'Solarize Anchorage' project focusses on emission reduction by encouraging homeowners in local communities to join together and purchase solar panels. This project also

involved larger municipal buildings. As of April 2020, the Egan Civic & Convention Center in downtown Anchorage has the largest solar energy system in the State. These smaller projects reflect the city's relative inexperience with comprehensive climate action and resilience planning; starting with smaller, more achievable projects. It is not made clear in the CAP if the Planning Department was directly involved in the Solarize project, or others listed in the CAP. The focus group conducted during fieldwork showed that most municipal planners were unaware of the CAP overall, as such, it can be inferred that planners were not involved directly in any smaller scale projects.

Planning is still utilised throughout the CAP. It is suggested to be a tool that could help manage urban forests and watershed management. The use of 'primary municipal liaison' and 'potential partners' in the sector sections indicate a flexible and aspirational approach to planning for resilience and climate action, albeit lacking tangible substance. The illuminative focus group session with members of the Department of Planning for the Municipality of Anchorage, both Current and Long-Range divisions, provided insight into their stance and involvement in the CAP production process, from inception to implementation. Whilst a couple of members of the Planning Department for the Municipality of Anchorage were present within the working groups, the department was not directly involved in the production of the plan. Not every planner present in the focus group had even read the CAP, which, at the time of fieldwork, had been released as a comprehensive draft document, not dissimilar from the final version. Whilst the Planning Department is referred to as municipality liaisons or potential partners, most planners concurred that the resources were not available for them to achieve these proposed objectives. They also questioned whether the plan was binding, stating they that they had not been directly consulted with regarding their role.

When asked about the supposed omission of the planning department, an academic who served on the steering committee said, while planners were not directly involved, the CAP was developed in-line with the 2040 Land Use Plan, in an attempt to streamline the implementation process with existing policies and plans. Despite this, an interviewee from the Mayor's Office discussed "*tensions*" with other municipal departments, commenting that many are not involved in a major capacity;

seemingly regretting the lack of engagement. Furthermore, it was noted that despite the majority of members of the CAP steering committee "*having no existing knowledge of how a plan should be set out"*, the planning department was still not consulted in any comprehensive manner. In a potential effort to address some of the tensions, a new position within the municipality was created for the purpose of overseeing the CAP production; the 'Energy and Sustainability Coordinator was employed with the intention of overseeing Anchorage's ongoing resilience journey, as the various committees put together for the purpose of producing the CAP have since been disbanded.

An abridged version of the CAP was also released in 2019, entitled '*Municipality of Anchorage Climate Action Strategy*'. This document also summarised the various applications of planning in building resilience and encouraging climate action. The following objectives directly refer to planning across all sectors:

- "Develop a municipal policy and procedure to consider life-cycle costs in planning and procurement." (p.5).
- **"Promote land use planning that minimizes the distance people have to travel by car and increases community resiliency:** Consistent with the 2040 Land Use Plan, continue to promote infill development, redevelopment, and mixed-use development." (p.6).
- **"Establish proactive planning approaches that incorporate climate change:** Incorporate climate projections (e.g., precipitation, temperature, flooding) in transportation, hazard mitigation, and development planning." (p.6).
- "Increase GIS capacity in order to analyze environmental data in relation to planning matters that may be impacted by climate change." (p.6).
- "Utilize effective and inclusive outreach methods and reduce barriers to participation in planning processes as well as new projects and programs." (p.7).

Again, whilst planning is discussed in various contexts, detail is not provided regarding the expectations of planners. The capacity for planners to undertake the tasks above is not explored in a consequential manner. Despite the CAP being

developed as a city-wide plan spanning a wide range of stakeholders and municipal concerns, the Municipality of Anchorage's Planning Department, both the Current and Long-Range divisions, were not directly involved from the outset of the CAP planning process and according to an academic on the steering committee, "*many planners still aren't involved*". Nonetheless, within the CAP, urban planning is suggested to be a "*unique opportunity to shape the future of our cities*".

Reflections on Anchorage's Resilience Journey

Climate Action Plan Reception

According to interviewees, the broader Anchorage community has largely responded well to the CAP; aside from the seemingly inevitable cohort of climate change deniers. An interviewee from the Mayor's Office intimated that many community members appreciated that the climate change initiatives were coming from the overarching urban government rather than being a bottom-up effort; citizens appear more willing to support and get involved with resilience and climate action in Anchorage as they have been shown that it is a city-wide priority. In spite of this, in terms of community engagement, challenges did emerge when citizens questioned the prioritisation of climate change over more pressing issues of crime and homelessness in the city. Approximately 40,000 people that work in Anchorage do not live in the downtown area and instead commute from the wealthier suburban areas of Eagle River and Chugiak, a 30-minute drive from the city centre. As such, concern also stemmed from lower income residents who lived in the downtown areas, that the city centre would be neglected in favour of higher income areas, although a steering committee member assured that the plan makes sure "*that actions do not only benefit wealthier residents.*" An academic on the steering committee expressed that other opposition to climate action is linked to more overall city and state-wide politics; " *the city is more right leaning and as such less accepting [of issues such as climate change]…if the plan had gone to public vote, it likely would have lost.*"

As of April 2020, the implementation of very small-scale projects is evidenced, such as the banning of plastic grocery bags, a community composting initiative and the

trialling of an electric bus system in the downtown area. The recent election for the Anchorage assembly saw many election campaigns reference the CAP and the desire to implement its actions, but there is still little evidence from stakeholders and the media that comprehensive implementation is being undertaken. Furthermore, the CAP will be put in a precarious position in the future.

The absence of wider support for climate change action in the state of Alaska could explain why the 2019 CAP lacks full realisation and concrete action points. More granularly, much of the language used particularly in the CAP, presents a 'language v. action', or 'vision v. reality' contest. The outcomes could err towards a diluted, yet cohesive approach to resilience across departments and stakeholders in the city, or more realistically, the clashes and counterproductivity that can be inferred from Anchorage's resilience planning process. A lack of engagement with wider discourses may also have contributed to the abiding knowledge gaps; notable examples such as the UN's Sustainable Development Goals (SDG's) or reports produced by the IPCC are not present. The insularity of the approach perhaps reflects the remoteness of the city.

Climate Change Denial in Alaska

It could be broadly understood that those representing the state of Alaska have been 'disinterested' in climate change, or at least have prioritised other matters. Building out from the municipal level, at the state level, Alaskan Governor, Republican Mike Dunleavy, halved the budget of the University of Alaska, where crucial research is being carried out on climate change and the impact it will have upon the state and city of Anchorage. Also, at this level, Republican state representative Donald Young deduced that climate change is simply a "money-making-machine for Al Gore" (Cranley, 2019). His website states that legislation to curb the effects of climate change is unnecessary and would negatively impact upon the state's economy and energy production (2005). Alaskan senators Lisa Murkowski and Dan Sullivan (no relation to former Anchorage Mayor Dan Sullivan) acknowledge climate change as a legitimate problem for the state but contribute to the narrative that it may not be anthropogenically caused, and therefore not a priority that needs to be addresses (Ruskin, 2015). This indifference to climatic issues is reflected federally; an issue

Boston is also suffering from. Over the last four years, the Trump administration has cut the budget for renewable policies and reversed climate change related programmes put in place during the Obama era. President Trump removed the USA from the 2015 Paris Agreement in 2017 and in response to the 4th National Climate Assessment report, steadfastly declared; "I don't believe it" (Bump, 2018). In reaction to this, former Mayor Berkowitz confirmed in a speech, on behalf of the city of Anchorage, that "We'll continue to address climate change, and we're doing it because it is a part of looking out for the future of the local economy and its about making sure we're good stewards of the place we live" (Herz, 2017).

Alaska had a 'Climate Action for Alaska Leadership Team', from October 2017 to February 2019. It was created by former Governor Bill Walker, partially in response to the US exiting the Paris Agreement and resulted in the creation of the draft Alaska Climate Action Plan. This focussed on balancing the development of the fossil fuel industry in the state and using some of that income to address climate change. However, the plan was never implemented, and the Climate Action for Alaska Leadership Team was abolished only two years later in 2019 by current Governor Mike Dunleavy, who took office in 2018. The reasoning being a doubtfulness of climate change and Alaska's contribution, and a preference of focussing on economic growth in the state (Brooks, 2019).

The lack of state-level mandates in relation to climate change have resulted in the city of Anchorage taking responsibility; an interviewee who served on the steering committee for the most recent *Climate Action Plan* suggested that the actions of the city are "*firmly rooted at the municipal level*" due to the lack of impetus at a higher level. This reflects a wider approach across the United States, particularly in reaction to Trump's removal of the USA from the Paris Agreement; a similar, city-centric view is presented in the Boston case study (Zhang et al. 2017). Nonetheless, at the city-level, there are no unanimous agreements on the negative impacts of climate change; the aforementioned focus group with members of the Municipality's Planning Department revealed that many urban professionals, along with residents, in the city are climate change sceptics. Despite its extreme location and environment, Anchorage has faced the catastrophic impacts of climate change relatively infrequently; a wider rhetorical shift in nomenclature from global warming to

climate change may also have served to soften any concern in the city and state. The avoidance of extreme events such as a major hurricane or coastal storm therefore do not provide enough stark evidence of climate change in the city to concern many people. This view frames the narrative of climate change denial within the city; it isn't visible therefore it isn't happening and at present, the benefits outweigh the cons; hinting at a reason behind planning inaction in the face of climatic threats. The heatwave of summer 2019 and the wildfires that encroached upon the city (which occurred after fieldwork had taken place), may have served to realise the threat of climate change for cynics in the city.

Climate Change Action and Mayoral Influence

The resilience journey for the city of Anchorage has been defined by the state and nation-wide rebuttal of climate change as a legitimate urban threat and has instead been reliant on the efforts of individuals at the urban level.

As shown, Anchorage has only more recently, comprehensively forayed into addressing climate change through resilience and planning, which has been pushed by a committed mayor and leadership approach. Prior to the former (Democrat) Mayor of Anchorage, Ethan Berkowitz being elected in 2015 (and again in 2018), the city was led by Republican Mayor Dan Sullivan between 2009 – 2015. During this time, an initial, '*Proposed Climate Action Plan for the Municipality of Anchorage*' (PCAP) (2009), was put forward by academics and students from the University of Alaska, Anchorage (UAA). The plan championed developing policies to encourage climate change mitigation activities as well as adaptation efforts. The plan focussed on community contributions to climate change impacts and managing land use to diversify communities and limit urban sprawl (PCAP, 2009). This reflects international approaches at the time, such as that of the IPCC, where long- and short-term mitigation remained the focus (IPCC, 2007). The plan identified city planning as a key "area of concern" (p.2). Regarding this, it was suggested that land use strategies should be developed to diversify urban development within the city whilst curbing urban sprawl, focussing on mixed-use development and increased availability of public transportation efforts. Specific initiatives included introducing impact fees to aid the development of capital infrastructure in the city by charging

developers to ensure "new developments 'pay their way'" (p.26). Green building standards were also proposed, calling for:

> "new buildings to abide by more stringent interior air quality standards, more efficient lighting, heating and air conditioning, better insulation and many other important environmentally friendly standards" (p.29).

Beyond urban planning, other initiatives and policy ideas covered urban aspects such as energy production and efficiency, transportation, waste management and community engagement (PCAP, 2009). This was the first time in the history of Anchorage that a plan dedicated solely to the impacts of climate change upon the city had been put forward. The plan was not adopted, due to a "*lack of interest*" from the city's administration at the time, according to an interviewee who was heavily involved in the production of the proposed climate action plan. This disinterest reflected the sentiment at state-level that deprioritised climate change, which is discussed later.

It has been shown that the current administration of Anchorage has taken steps to address climate change in the city, against the backdrop of climate change denial and misinformation. Former Mayor Berkowitz, along with his wife, former First Lady Mara Kimmel, installed a top-down approach to promoting resilience and climate action in the city. When Berkowitz came to power in 2015, Anchorage joined the Welcoming Cities Initiative and the Resilient Cities Network.

Regarding the definition of resilience in the Anchorage context, there are many options, which may go some way to understanding the cloudiness of some approaches to climate action, in plans discussed later. Berkowitz stated in the interview, "We contend with issues related to the classic definition of resilience as being able to deal with shocks and stresses" (Sheridan, 2017). According to a section on the Municipality of Anchorage's website called the 'Mayor's Corner', resiliency is also defined as the ability for a city to bounce back after acute shocks and stresses and emphasises stewardship in the city. It also includes minimising residents' exposure to risk from natural and man-made hazards (Municipality of Anchorage,

2019). Furthermore, placemaking and 'growth supporting' features are presented as a tool to diversify land use and promote resilience and resilient growth.
An aide for the mayor also stated during a fieldwork interview, that for the Municipality of Anchorage, their definition of the term resilience is based upon the Rockefeller 100 Resilient Cities definition:

> "the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience." (Rockefeller Foundation, 2018).

Whilst Anchorage's application to the Rockefeller Foundation's programme was not accepted, the pursuit of resilience has persisted, with the mayor at the helm. The city was however part of the 'Cities of Service – Resilience AmeriCorps' programme (which was linked to the Rockefeller Foundation) between 2015 and 2017. The programme intended to contribute to "preserving a long-standing history of self-reliance" in the city (Cities of Service, 2016). Though the programme in Anchorage is now over, it provided the city with expertise and funds over a two-year period, focussing on the issue of food security. This allowed former Mayor Berkowitz to promote the concept of resilience amongst local residents and build local gardens and greenhouses. According to the Cities of Service website, the programme found success in Anchorage due to "the increased capacity in city hall" and local connections and knowledge (Cities of Service, 2016). Other smaller scale pursuits, include the SEED Lab, run by the Anchorage Museum. In an interview with a museum curator, who also worked closely with the Mayor, it was explained that the SEED Lab promoted public art as a way to bring attention to climate change and to seek "*solutions through energy, equity and design*". The scope of the Resilience AmeriCorps programme, and the SEED Lab were both carried out on a smaller scale, but have aided in providing an opportunity for the Berkowitz administration to peruse resilience in a larger, citywide capacity. The two roadmaps, the 2019 CAP and other examples such as the SEED Lab signal a paradigm shift in the administration of Anchorage; climate change and resilience have become a priority to address despite state and federal disinterest. Former Mayor Berkowitz and the former First Lady Kimmel both have personal interests in the cause. Berkowitz holds

an MPhil in Polar Studies whilst Kimmel holds a PhD in Environmental Science and Policy. An interviewee from the Mayor's Office confirmed that the personal interest in climate change and the environment was a key trigger that began the resilience journey for the city.

Summary

Anchorage's experience of being a city located in an extreme environment and having to cope with extreme climatic conditions, appears to have made a limited impact upon the city's current approach to dealing with climate change and building resilience. One could infer that having extremes as a norm could lead to complacency when responding to climatic threats. Adding to this, the overarching focus on economic development as a key priority for the city has meant that with the lack of catastrophic extreme events alongside the desire for urban and economic growth, addressing climate change is not a priority for many stakeholders in the city, particularly those who are sceptical of its existence.

Due to the relatively small number of plans produced by the Municipality of Anchorage, these were first analysed together to understand how planners in the city were approaching climate change. Most of the citywide plans view climatic challenges through the lens of geohazards or hazard management, and specific planning actions revolve around land use and avoiding development in risk prone areas. As resilience entered Anchorage's planning lexicon, it was centred around community resilience and the capacity for citizens to be self-sufficient. Nonetheless the idea of the infusion of resilience in the Municipality's Planning Department, mentioned earlier in the chapter, never comprehensively came to fruition, perhaps hinting that for planners, resilience was not a key priority, and needs longer to permeate into everyday planning practice in Anchorage.

The analysis of the non-Municipality produced documents showed a similar focus on economic development as the main priority, with the idea of corporate resilience taking precedence over other resilience forms. Again, the use of land use planning to steer development away from hazardous zones is noted as a potential planning approach, but few concrete planning ideas are presented. The majority of the

documents analysed in this phase were not comprehensively engaged with in any of the planning documents produced by the city.

Overall, disconnect and frustration reign when investigating Anchorage's resilience journey, such as the disassociation between the planning profession and emergency planning. The lack of involvement of the planning department in the production of the CAP was never satisfyingly explained; remaining a choice that is likely connected to broader bureaucratic barriers and communication breakdowns, alongside a lack of subject-specific knowledge. Institutional impasses emerged again with the subject of ingrained climate change denial, or even indifference. This particular challenge goes beyond the scope of the municipal level and therefore is a considerable undertaking to address. Here, it can be seen that the key CAP stakeholders faced an uphill battle. An overarching sentiment that climate change is an 'afterthought' could be inferred. Many of both the municipal and non-municipal plans analysed prioritise urban and economic growth within the city. The drive from the Mayor to promote climate action appears more driven by a personal 'passion' as opposed to larger-scale institutional and governmental intervention.

Looking to the Future

Going forward, 'mainstreaming' resilience has emerged as a new priority. In 2018, Anchorage held a resiliency summit to encourage the development of networks of resilience across the USA. However, as the city only produced its CAP so recently, "*implementation successes are yet to be seen"* (steering committee member interview). Monitoring is also a key priority in the future, despite confusion over who is taking ownership of this. The precarity of resilience in Anchorage is a primary concern that is reliant on successful the embedment of resilience as a priority for the city.

Thus, if the resilience agenda is not fully institutionalised by the time that the Mayoral elections are held in April 2021, the work completed could be in jeopardy. An interviewee from the Mayor's Office hoped that an external body would be created in time, to ensure that the work put into the resilience efforts could be fully embedded within Anchorage's urban governance system; avoiding the burden of

reliance being placed solely upon the current administration. The recent controversy and replacement of Berkowitz with an acting mayor until the election further throws into jeopardy the future of resilience in the city.

The fragility of resilience in Anchorage is a threat that could undermine efforts and create tensions across the city unless it is cemented more deeply within the urban governance and planning systems. Though a change of governmental administration could result in the climate action and resilience work to cease, particularly if views on climate change are more reflective of state and federal views. The recent victory Joe Biden in the November 2020 presidential election in the USA could signal a more positive outlook for Anchorage's resilience agenda, as a focus on climate change, and more support for cities is expected to return.

Despite the variety of challenges faced by committed stakeholders, particularly over the CAP production process, resilience is continuing to be pursued by Anchorage, albeit potentially at a small scale, without planners at the helm. As mentioned, the administrational fragility of resilience in Anchorage hinders larger-scale mainstreaming of resilience across stakeholders and municipal departments. For a stronger resilience and climate action planning agenda in Anchorage, more institutionalisation is required, along with an equal balance between economic and urban growth and the meaningful acknowledgement of climate change across the municipality. For the moment, the CAP exists, though implementation efforts are slow. Liveability and equity advance as important values for the municipality, in line with climate action, as "*climate is just a layer of resilience within Anchorage*" (steering committee member interview). At 2019's annual 'Anchorage Bike to Work Day', former Mayor Berkowitz stated, "Fundamentally, cities are more nimble than states or countries. Cities have the ability to move quickly and change direction", he asked, "If cities don't act, who will?" (Hermes, 2019).

Chapter 6
Boston Case Study

Introduction

Case Study 2 is on the city of Boston, Massachusetts, USA. Boston has been defined as extreme-ing for the purpose of this research, due to the city's comprehensive advancement of its own resilience agenda that focuses upon the existential threats from the impacts resulting from current and future climate change.

This case study city provides an extreme-ing contrast to the extreme city of Anchorage. Compared to Anchorage, Boston has a much longer urban development and planning history and has been addressing climate change in plans for over a decade. The city began its climate action programme in 2000 by joining the 'Cities for Climate Protection' Campaign of the International Council for Local Environmental Initiatives (ICLEI), which involved local urban governments pledging to reduce greenhouse gas emissions.

In Boston, climatic threats for the city have been mounting in recent years; sea level rise in particular puts much of the city at risk. The city initially addressed climate change through efforts to reduce emissions and mitigate effects, also focussing on preparedness. This shifted towards adaptation as threats grew and resilience entered the planning lexicon; the focus moved to longer-term planning and larger-scale infrastructural projects. Beyond this, the focus on equity and citizen engagement grew, especially as ties to the Rockefeller 100 Resilient Cities programmed were made. Going forward, the city is seeking to mainstream resilience into its day-to-day planning operations.

Boston has faced challenges along the 'journey'; like Anchorage, federal disinterest in climate change action has forced issues to be addressed at the city level. Concerns such as siloed working conditions, an over-involvement of NGO's, and over-saturation of planning documents, and balancing development with resilience have

thrown up roadblocks along the way. As climate change threats grow and starkly impact continental USA, Boston has mobilised to address the range of impacts.

According to an interview with a Senior Planner at the Boston Planning and Development Agency (BPDA), some of the most pressing issues for Boston include: "*Avoiding situations like Houston and New Orleans, by protecting the most vulnerable, promoting (multi)municipal collaboration and embedding resilience beyond the municipal level, so that changes and shifts in power don't affect the resilience agenda*". The plans analysed in the chapter also focus on priorities such as collaborative working between stakeholders, as well as institutionalising and mainstreaming resilience, in an attempt to avoid the fragile resilience agenda Anchorage faces.

The chapter begins with an historical overview of Boston, and provides context on the social, physical and governmental development of the city. Following this, in the second section, the Boston Planning and Development Agency is explored; mayoral influence on the city, and the presence of NGO's in the climate action and resilience agency is also discussed. From there, an in-depth analysis of relevant plans is presented. As with Anchorage, the following phaseology table breaks down the resilience and planning progression in Boston, which is detailed in the second half of the chapter.

Phase	Plans	Emphasis
Climate Action in Boston – Mitigation, Preparedness & Collaboration	Climate: Change – The City of Boston's Climate Action Plan (2007)	First stages of climate action in Boston, emergence of climate specific plans. A focus on mitigation and emission reduction: *'Greenhouse gas emission reduction'*
	Sparking Boston's Climate Revolution (2010)	CAP updates see an inclusion of adaptation and specific planning efforts in relation to urban development (but the focus remains on mitigation): *'Adaptation planning'* An administrational shift in 2014 hailed a bigger focus on citizen engagement and preparedness: *'Preparedness policy'* Multi/Cross-departmental working emerges as a key approach: *'Communication and outreach'*
	2011, 2014 & 2019 Climate Action Plan Updates	
Climate Ready Boston – Long-Term Planning, Vulnerabilities & Resilience	Climate Ready Boston: Municipal Vulnerability to Climate Change (2013)	Sea level rise identified as the key threat to the city, preparedness remains as a priority. More comprehensive use of resilience in terms of planning, urban design and engineering: *'Resilient infrastructure'* A move to look towards long-term vulnerabilities and solutions. Specific planning actions and multi-departmental working to address sea level rise: *'Integrated solutions'* Continued focus on citizen engagement.
	Climate Ready Boston (2016)	

Citywide Plans – Citizen Engagement, Growth & Mainstreaming	Imagine Boston 2030 (2017)	Imagine 2030): first citywide plan in 50+ years Finding a balance between encouraging growth in the city and citizen enjoyment with adaptation and climate resiliency: *'Healthy Environment'* 100RC (ran alongside Climate Ready Boston) applied a resilience 'lens' to many issues within Boston beyond climate change i.e. race: *'Social and economic resilience'* Links back to mitigation and emission reduction, as well as preparation: *'Accelerate carbon neutrality'* Moving to the future; mainstreaming resilience and planning: *'Significant strategic planning'*
	Boston's Preliminary Resilience Assessment (2016)	
	The Blueprint: A preview of the Principles & Framework for Boston's Resilience Strategy (2016)	
	Resilient Boston: An Equitable and Connected City (2017)	

Table 12. *Boston Resilience and Climate Action Planning Phaseology*

Boston Background and Context

Boston is an east coast city which is experiencing increasing sea levels and more frequent coastal storms, known as Nor'easters. Recent examples include the winter storms of early 2018, which caused considerable flooding in the downtown area as well as heavy snow and structural damage along the coastline. If sea levels continue to rise in the Boston area, the Climate Ready Boston initiative predicts that by 2070, upwards of 90,000 residents in the city will be at severe risk, along with billions of dollars of infrastructure, property and business (CRB, 2016; Zukowski, 2018). Boston's journey towards resilience planning and climate action has been comprehensive since the start of the 21st Century. Notable aspects of the process include the focus on community and social injustices, the considerable power of the Mayor, and the unique position of the planning department within the urban

governance system. The abundance of related plans and stakeholders have served to contribute to a somewhat siloed approach; however, Boston remains a national leader for urban resilience and climate action.

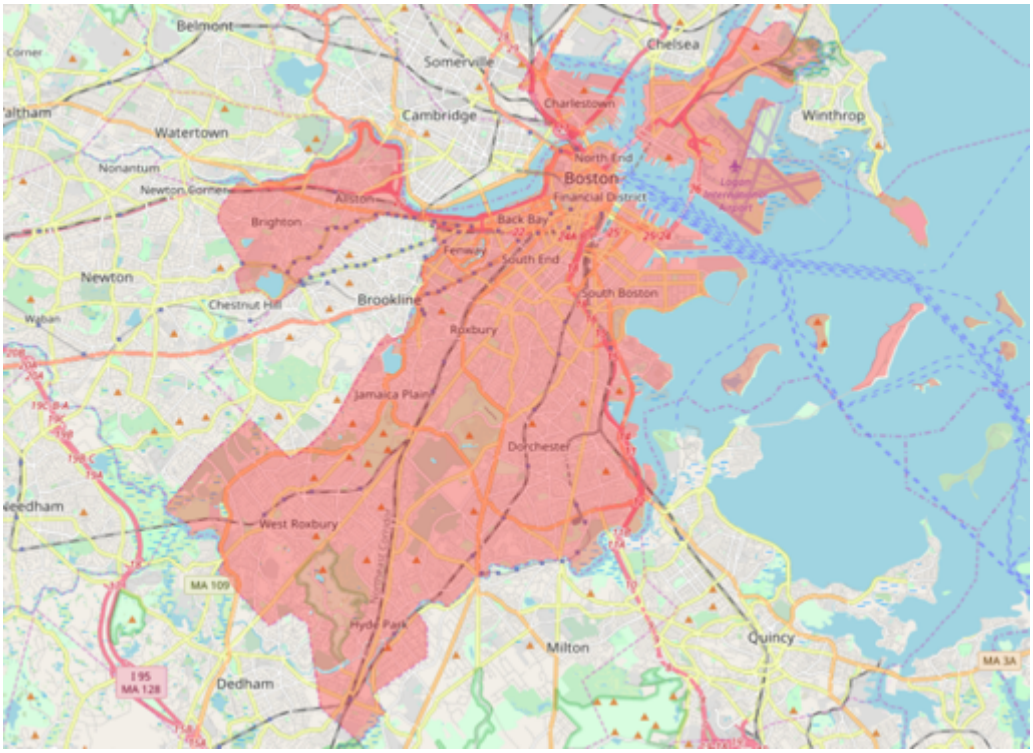
Figure 14. *Boston Skyline (Boston Magazine, 2020)*

Case Study Area

For the purpose of this project, the case study area is the boundary as defined by the City of Boston, also acknowledging the neighbouring city of Cambridge. Boston has a population of approximately 685,094 and is the largest and most populous city in the state of Massachusetts. Boston is located on the East Coast of the United States, on Massachusetts Bay in the New England region of the country:

Figure 15. *Boston from Above (Google Earth, 2020)*

The Greater Boston Area extends north into New Hampshire and west into Rhode Island and has a combined population of over 8 million people, which includes over 80% of the population of Massachusetts. The metropolitan area of Boston (the focus area of this study) is much smaller at 89.64 square miles in size. Boston comprises 23 officially designated neighbourhoods. The maps below show the metropolitan boundary of the city and the case study area:



Figures 16 & 17. *Metropolitan Boundary of Boston & Case Study Area (Open Street Map, 2019; Boston Open Data, 2019)*

History and Urban Growth

Boston was first settled by Europeans in the early 1600's when English Puritan Colonists established themselves along Massachusetts Bay before the city itself grew due to its sheltered location by the water. The city was based upon puritan ethics with an emphasis on education, which has been maintained up to the present day; the first public school in America was established in the city. The city was embroiled in a number of the French and First Nation wars over the following century, before the British were ultimately victorious. Up until the 1800s, Boston existed as a busy port city, and was the largest settlement in British America, before being overtaken in the early 1800s New York and Philadelphia, both in size and wealth. Boston played a crucial role in many events of the American Revolution and was an important part of the Atlantic triangular slave trade. In the 19th century, the city boomed, as a result of an influx of European immigrants; manufacturing and international trade provided further economic success. Over this century the city grew from approximately 24,000 residents to 560,000 by the start of the 20th Century (O'Connor, 1995).

Between the 1600s and 1800s, Boston tripled in physical size as a result of land reclamation and much of the city now lies on former wetlands, marshes and mudflats. In particular, what is now the Back Bay neighbourhood was the most significant of the reclamation efforts; almost 600 acres of marshlands were filled in. The Great Fire of 1872 provided much of the rubble and debris that was used to fill in the harbourfront of the city. The geographical expansion of the city was also aided by the regular annexation of neighbouring communities over the 18th and 19th Centuries (Kennedy, 1994).

By the mid-20th Century, the population had grown to over 800,000 before falling again to just over 600,000 in the present day. The first half of the century saw an economic downturn in the city, following the two World Wars and the Great Depression but by the 1970's the city had developed to become a financial hub for the region, as well as a centre for academic and medical research and treatment. Racial tensions marred the political landscape throughout this period. Large-scale urban renewal projects dominated the city during the mid-20th Century period; several neighbourhoods were demolished to make way for new developments and

major transport infrastructure projects, such as the central artery through the downtown area were completed (O'Connor, 1995; Glaeser, 2005).

By the 21st century, the population had stabilised, and urban renewal had slowed. The central artery was the focus of much time, money and disruption in the early to mid-2000's, as The Big Dig project went underway to sink the road below the city. The city continued to be a hub of academia, technology and politics and received the world's attention in 2013 due to the Boston Marathon bombing, the ripple effects of which forced planners to confront new matters of urban security and resiliency in the city, as well as in the wider context (De Souza & Flanery, 2013; Cook, 2013). The section below will detail the climate change related challenges that Boston has faced as well as the upcoming challenges, before exploring the city's planning response.

Urban Challenges: Historic

Boston has a humid continental climate, a combination of oceanic and humid sub-tropical, with warm summers and cold winters with an abundance of precipitation. The mean summer temperature is approximately 23°C and the mean winter temperature is around -1.7°C. The city's coastal location helps to moderate the climate however it increases the city's vulnerability to coastal storms. Historically, extreme events in Boston's past tend to have been anthropogenic in nature, rather than as a result of environmental conditions or climate change. The Great Molasses Flood of 1919 stands out as a unique example of an extreme event in the city's history, which involved a storage tank of molasses bursting and killing 21 people in its wake. Boston has also endured societal clashes and tensions and riots, such as discrimination against Irish immigrants in the 19th Century. Racial tensions reached crisis point in the 1960's and 1970's, triggered by the desegregation of Boston Public Schools which led to large-scale riots (Whitehill & Kennedy, 2000). Today, institutionalised racism is still a pressing and under-addressed issue. In a national survey commissioned by the Boston Globe's Spotlight Team, Boston was ranked as the least welcoming city to people of colour in the USA (Johnson, 2017). The city also has a history of urban renewal and urban development projects that have caused controversy and a profusion of challenges for residents of the city. These are explored in detail later.

Environmental challenges for the city have manifested primarily in the form of snowstorms and blizzards. The blizzard of 1978 for example, saw 69cm of snow accumulate in the city, and over 100 people died across the northeast as a result. As mentioned previously, nor'easter storms provide Boston with its share of extreme weather events, causing widespread coastal and tidal flooding, heavy winds and precipitation. The city has been hit by a number of hurricanes; most recently, Hurricane Sandy in 2012 caused considerable damage in Boston, and in many ways, acted as a 'trigger' for the city, as the notion that the city was becoming more extreme was cemented (Friedman et al. 2019).

Urban Challenges: Current

Today, Boston is facing a range of climatic issues, including flooding, storm surge and extreme temperatures, as well as its vulnerable position on reclaimed land. For the city, Hurricane Sandy was a "*wake-up call* [which] *kick-started climate action in Boston*" (interview with a Massachusetts Institute of Technology (MIT) Sustainability Officer). A senior planner at the BPDA stated that the city is "*meeting the issue at the coast*" as climatic impacts are imminent and there is no capacity for the city to retreat. Boston's overarching approach to resilience planning and climate action is "*very forward looking*", acknowledging that whilst plans go to 2070, "*sea-level rise will not stop then*", and the city must look far into the future (BPDA planner interview).

For the past 20 years, the city of Boston has acknowledged the threats that a changing climate will bring to the city, joining the Cities for Climate Protection Campaign of ICLEI-Local Governments for Sustainability in 2000 and signing the US Mayor's Climate Protection Agreement in 2005. The city's extreme-ing nature has been identified and in more recent years and more significant efforts have been made to address climatic issues in the city. In 2015, Boston joined the (now disbanded) Rockefeller 100 Resilient Cities programme. According to this programme, Boston is facing a number of climate change related shocks and stresses including:

- Ageing infrastructure
- Blizzards
- Coastal/tidal flooding
- Extreme heat
- Rainfall flooding
- Sea level rise/coastal erosion
- Severe storms
- Storm surge

(Rockefeller Foundation, 2016).

The city published its resilience strategy, '*Resilient Boston – An Equitable and Connected City*' in 2017, in partnership with the Rockefeller Foundation. The city has also published a number of climate change specific plans; '*Climate: Change - The City of Boston's Climate Action Plan*' (2007), '*A Climate of Progress - City of Boston Climate Action Plan Update 2011*', '*Greenovate Boston - 2014 Climate Action Plan Update*' and most recently, the '*2016 Climate Ready Boston Plan*', all of which are discussed in detail later in the chapter.

Whilst no absolute certainty can be placed upon what future impacts climate change will have on Boston, there are a number of threats. Relative sea level rise is increasing and could have devastating impacts upon Boston's harbour and much of the downtown area. Nonetheless, the waterfront is a prime location for real estate development; the recent development of the Seaport District area of the city has occurred in spite of the sea level rise threats. Reconciling development and climate change will grow as a challenge for Boston. The following image shows a prediction for how much of the city would be flooded by a 3-ft rise in sea level:

Figure 18. *Potential Sea Level Rise in Boston (Architecture 2030)*

3 feet is the 'worst case scenario' projection for sea level rise in the city, according to the Boston Research Advisory Group (BRAG). This rise would affect upwards of 33,000 households within the city, and cause billions of dollars' worth of damage, as well as creating the issue of climate refugees across the city and state. Crucial transportation services such as Logan Airport would also become entirely cut off (BRAG, 2016). Although Boston has a moderately temperate climate, it may become more prone to increasing bouts of extreme heat, as well as harsher, colder winters. The warming climate will also increase precipitation levels, potentially leading to heavier snow in the winter months. There is also evidence that tropical storms will increase in frequency, turning into hurricanes that can devastate cities such as Boston (Friedman et al. 2019). Boston has had some extreme weather events; they are, however, worsening, and the impacts are becoming more widespread and costly, both financially and in terms of lives. The city is becoming more extreme and has been working towards mitigation and adaptation efforts to try to ensure that it can withstand future shocks and stresses that may have potentially devastating impacts. Urban planning has begun to be more fully intertwined within this process as a tool to build resilience within Boston, by modifying and updating its urban form and more comprehensively integrating planning into the wider urban governance system, particularly through channels such as citizen engagement, in an attempt to tackle climate change.

Figure 19. *Flooding on Atlantic Avenue, 2018 (Gregiore, 2018)*

Current Urban Form

Presently, Boston is a mid-rise city that is relatively low-density. The land-use is a combination of residential, commercial, industrial and recreational, as shown in the land-use map produced by the BPDA below. Boston is neighboured by the city of Cambridge, home to Harvard University and the Massachusetts Institute of Technology, amongst others, as well as the cities of Brookline and Somerville. The City of Boston works closely with these neighbours as a result of the sprawling urban space that they share. Below is the current land use map of Boston produced by the BPDA, as well as a figure ground diagram showing the density and form of the city's built environment.

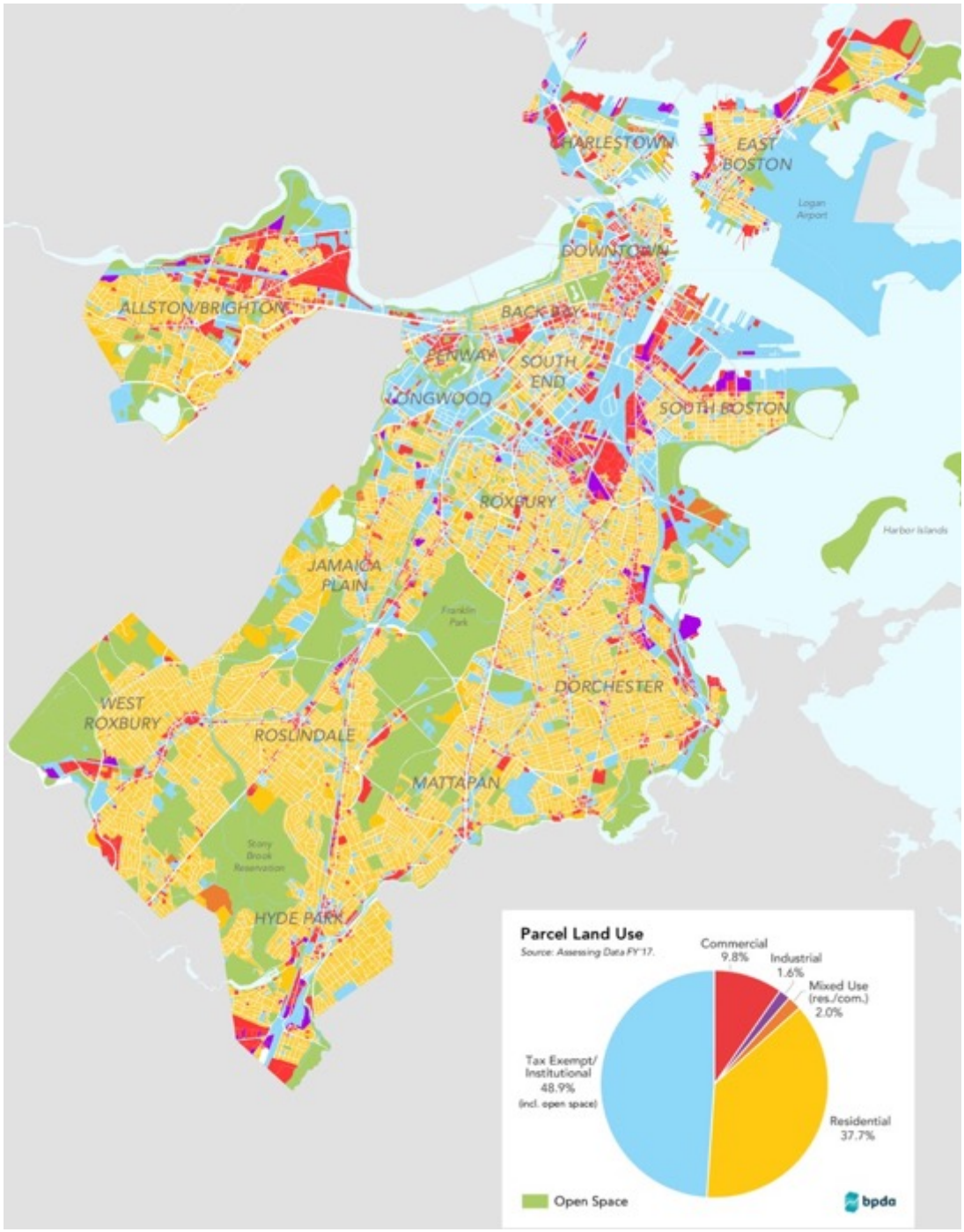


Figure 20. *Land Use Map of Boston (BPDA, 2019)*

Figure 21. *Figure Ground Map of Boston (Rankin, 2005)*

Urban Governance

Boston operates under a mayor-council governance system; the executive power of the mayor is particularly extensive in the city. The current mayor is Martin "Marty" J Walsh, who came to power in 2014, following his predecessors 20-year reign over the city. Mayoral elections are held every four years and Boston City Council elections every two. As the capital city of the state of Massachusetts, Boston is also involved in state-level politics. The city has two congressional districts, neither of which have seen significant Republican representation for over a century. The City of Boston is the governing body overseeing all municipal concerns; however, planning responsibility has a unique position within Boston as the BPDA, the public agency that oversees planning in the city, also has a role as a real estate owner and developer, as well as being an approval authority. The BPDA, and its historic incarnations are explored in detail further in the chapter.

The Resilience & Climate Action Journey of Boston

Overall, Boston's important position within Massachusetts and the broader New England region; as a financial and population hub, as well as its physical coastal location means that continuing to undertake appropriate climate action in order to be resilient in the face of climate change is a pressing priority in the city. As discussed, climatic threats are worsening, whilst social issues such as institutionalised racism also endure. The precarity of the city's position on reclaimed land puts sea level rise as a major threat. Although Boston has been combining climate action and urban planning for longer than Anchorage, it is only in more recent years, since the start of the 21st Century, that more significant action has begun to be taken, such as joining the aforementioned ICLEI Cities for Climate Protection Campaign. The following section provides an exploration of Boston's resilience and climate action journey, since the previous administration issued 'An Order Relative to Climate Action in Boston' in 2007, to the first resilience-dedicated plan in 2016, and planning efforts in-between and beyond this.

In the next section, to provide context to the overall urban planning approach in Boston, the history of the BPDA is explored, to understand the reputation of the department within the city, and the implications of it more recently becoming a more pluralistic planning organisation. As opposed to Anchorage, Boston has a plethora of climate and resilience related plans produced by the city, as a result only the most relevant are presented and analysed.

Opening 'The Vault': the Boston Planning & Redevelopment Agency

Urban planning in Boston has a past marred with mistrust and controversy, starting as a process overseen by a 'boys club' of powerful city players intent on slum clearance and urban renewal (Horan & Jonas, 2015). More recent major infrastructure projects have also negatively impacted Bostonians views of planning, with connotations of disruption and overspending (Grieman, 2013). Climate change as a key planning concern in Boston has only emerged since a planning overhaul was taken when the Walsh administration came to power in 2014, marking an attempt to

shift planning in Boston towards a more transparent and inclusive process. Below is a brief overview of the planning history in Boston up to the present day.

The City Beautiful movement of the late 1800's and early 1900's provided the impetus for Boston to create an official planning board, in 1914. Prior to this, no formal planning agency existed within the city, although as discussed above, a significant amount of reconfiguring occurred during the growth of the city to shape and manipulate its urban landscape. In 1935, the Boston Housing Authority (BHA) was formed as a public agency, to provide housing to subsidised low-income families in the city. The 'Vault', a committee of powerful business leaders and politicians (formally the Boston Coordinating Committee) was established during the 1950's, with members in support of large-scale slum clearance and urban renewal in the city. The Vault's support also extended to a movement attempting to take development power away from the city government and grant a new authority the power of eminent domain, and the ability to rapidly enact urban renewal (Fein, 2011; Mohl & Rose, 2012). In 1957, the Boston Redevelopment Agency (BRA) was founded, and superseded the power of the BHA. The BRA quickly eradicated city slums, displacing over 8000 residents and developed to become a "single, all-powerful agency that is today, accountable only to the mayor…[it] became a one stop shop for all the city's planning and development needs" (Slade, 2013). The BRA (which has since become the BPDA) has become synonymous with controversy and mistrust since its inception; intrinsically linked to the controversial urban renewal programmes and neoliberal prioritisation of profit and development. The renaming in 2016 by the Walsh administration, was an effort to rebrand and appear more transparent and less bureaucratic, following an audit that identified the organisations' low transparency, inconsistent review process and dearth of planning and coordination (Seasholes, 2003; Anzilotti, 2019).

The BPDA has remained a 'body politic and corporate', meaning that while it falls within the City of Boston, it is also able to act independently due to being granted statutory authority from its inception; it also holds the power of eminent domain (Trickey, 2016). As such, the BPDA has the authority to acquire and sell real estate and land and offer tax initiatives to encourage development in the city, as well as holding the authority of approval on development projects; for many, this is seen as a

conflict of interest. A Zoning Board of Appeals also exists within the City of Boston to manage zoning requests from residents. Whilst the Mayor could be viewed as a figure of omnipotence across much of the municipal workings of the city, the BPDA occupies a unique position slightly outside of the mayoral remit. An interview with a senior planner at the BPDA illuminated on the power of the department. Established in the 1950's, the BPDA is not an official department of the City of Boston, standing as its own entity that, whilst funded by the City, need not comply with state standards, and can use private consultants. In terms of the implications this may hold for the resilience agenda in Boston, the lack of standardisation and disconnect with city government can lead to conflicts and mis-prioritisation of resources.

The interviewee expanded on the 'uniqueness' of the BPDA; "*it combines planning and development, where other cities keep them separate. New mayors often say they will overhaul the BPDA but when they see how harmoniously it works, they leave it be*". Nonetheless, in the wider sphere of complex urban decision making, the 'harmonious' nature of the BPDA comes into question. A climate programme associate at an NGO, the Barr Foundation, provided an outside perspective on the BPDA. She argued that confusion tended to shroud the department; "*the ambiguity of what umbrella the BPDA falls under can lead to complications regarding responsibility, accountability and implementation, as well as communication with other stakeholders. People aren't sure who's in charge of what, or who works where*". Furthermore, a coordinator for the Climate Ready Boston initiative added that the BPDA faces "*tension and politics*" with regards to issues such as land use. This can hinder cohesion across city agencies and stakeholders, where roles are not clearly defined, leading to either an overlap of effort, or accidental omittance of certain priorities. Furthermore, Anzilotti (2019) notes that the unique linkage between the Mayor and the BPDA creates an "insular dynamic" (p.35) wherein the Mayor wields an inordinate amount of power over development in the city; this led to swathes of urban renewal across Boston.

Beyond urban renewal, the infamous, polarising project, the 'Big Dig' and Rose Kennedy Greenway developments are also the product of the BDPA, the controversial project serves to further jeopardise people's trust in the department. Although it was completed over a decade ago, the financial debts from the project

still burden the City of Boston across many departments, a non-profit consultant interviewee also suggested that climate action and resilience were not priorities during the project and thus may exacerbate the climatic threats the city already faces.

The present-day vision of the BPDA[3], according to their website, is to plan "Boston's future while respecting its past" and to guide "physical, social, and economic change in Boston's neighborhoods" which will ultimately create "a more prosperous, resilient and vibrant city for all." (BPDA, 2019). The BPDA covers all aspects of planning in the city, from transport and infrastructure, to urban design, neighbourhood planning, and climate change and environmental planning. Published in September 2017, the '*Imagine Boston 2030*' plan was the first citywide plan to be published in over 50 years, following the 1965 '*General Plan for the City of Boston and the Regional Core*'. Over the years, numerous planning documents have been produced by the BPDA. The agency also works closely with other city agencies such as Parks and Recreation to produce plans. More recently, the focus has turned to the impacts that climate change will have upon the city as it faces an extreme-ing future.

Overall, the history of mistrust associated with the BPDA weakens its position with regards to citizen engagement and opinions. Urban renewal has left a scar on Boston and its residents, ensuring that urban planning, and urban planners themselves are not necessarily viewed positively. Breaking down a 'locked-in' culture within planning, such as the legacy of the BRA is a challenge, reflecting the traditional and rigid nature of urban planning itself. The turn to resilience however, at the urban level with the mayor at the helm, has opened up a conduit for the BPDA to improve their reputation by pursuing meaningful and positive climate action.

Starting Boston's Resilience Journey

According to a contact at the BPDA archives, the first plan in Boston in the 21st century related to environmental concerns was called 'everyone benefits from green

[3] The BPDA consists of the following departments who work together to take care of planning related decision making and responsibilities across the city: Communications, Compliance, Development Review, Director's Office, Executive Director/Secretary's Office, Finance, General Counsel, Information Technology, Planning, Real Estate, Research (BPDA, 2019).

building…'. It was produced by the now disbanded Green Building Task Force in 2004, and focussed on construction standards to reduce emission, with no specific planning instruction, there was however, a recognition that a commitment to sustainable development was required from planners and the wider community. The term climate change is not used in the plan and didn't emerge as a priority for the city until a few years later.

In April 2007, former Boston Mayor Thomas M. Menino issued an executive order (*Executive Order Relative to Climate Action in Boston*) covering 15 action points which required all Boston city offices to incorporate climate change projections into their working processes. This order was directed to all "Cabinet Officers, Department Heads, and City Employees", coming directly from the Mayor's Office (City of Boston, 2007, p.2). This project is focussed on the city-level approach to climate action and resilience planning, paying particular attention to specific climate related plans produced in more recent years, as discussed before. The City of Boston has produced a number of climate related plans since former Mayor Menino's Executive Order in 2007, which are analysed in detail in the upcoming section.

The following section explores the timeline of Boston's climate and resilience related plans produced by the city since the 2007 Executive Order. The document analysis is presented alongside interview data collected during the fieldwork portion of the project. Key challenges faced by planners and the city as a whole are interspersed throughout the analysis, with an overall aim to understand the capacity with which successful resilience and climate action planning in Boston is being undertaken[4]. The phaseology is utilised to track the narrative throughout the planning process in the city.

[4] For the purpose of this study, unlike Anchorage, non-city-wide plans not relating explicitly to climate change or resilience have been omitted due to their volume and avoidance of an oversaturation of less-relevant planning documents. As the study is based on the city-level, no further regional plans are analysed in-depth; small scale neighbourhood plans have been omitted due to time restraints and to avoid an oversaturation of planning documents in the analysis. The plans have been identified as key planning related documents that directly consider climate change and resilience and were all produced by the City of Boston.

Climate Action in Boston

Phase	Plans	Emphasis
Climate Action in Boston – Mitigation, Preparedness & Collaboration	Climate: Change – The City of Boston's Climate Action Plan (2007)	First stages of climate action in Boston, emergence of climate specific plans. A focus on mitigation and emission reduction: *'Greenhouse gas emission reduction'*
	Sparking Boston's Climate Revolution (2010)	CAP updates see an inclusion of adaptation and specific planning efforts in relation to urban development (but the focus remains on mitigation): *'Adaptation planning'* An administrational shift in 2014 hailed a bigger focus on citizen engagement and preparedness: *'Preparedness policy'*
	2011, 2014 & 2019 Climate Action Plan Updates	Multi/Cross-departmental working emerges as a key approach: *'Communication and outreach'*

Table 13. *Mitigation, Preparedness & Collaboration*

The first climate focussed plan for the city of Boston was:

'Climate: Change – The City of Boston's Climate Action Plan' (2007)

Along with the former Mayor Menino's executive order, the year of 2007 also saw the publication of the first climate specific plan for the city, as mentioned prior. Entitled *Climate: Change – The City of Boston's Climate Action Plan*' (CC-CAP), the plan is a brief, 32-page document with an emphasis on greenhouse gas emission reduction in the city, published by the City of Boston. Resilience does not appear as a word in the plan, (and therefore was not yet part of the planning arsenal in the

city). Furthermore, urban planning itself as a tool is not considered. Nonetheless, the dawning of climate action is evidenced by initiatives such as '*Grow Boston Greener'*, '*Recycle More'* and '*Big Belly Cordless Compaction – Solar Powered Trash Units'* (City of Boston, 2007). Whilst the 2007 CC-CAP was not ground-breaking in its approach, its operationalisation of positive action in the face of climate threats to Boston set in motion a continued endeavour to address climatic issues and peruse climate action and resilience in the city. Following this, the second plan was released in 2010:

'Sparking Boston's Climate Revolution' (2010)

In 2010, the report *Sparking Boston's Climate Revolution* (SBCR) and its summary *Climate Action in Boston*, were both produced by the Boston Climate Action Leadership Committee and the Community Advisory Committee on Climate Action (which have since been disbanded following the change in city administration in 2014). The report was to aid the implementation of the 2007 Climate Action Plan. Though resilience itself does not yet appear in the lexicon, the focus remains on emissions reduction, to mitigate the effects of climate change upon the city, but also incorporates a new focus on adaptation through a number of recommendations:

> "Give adaptation the same priority as mitigation: Develop an adaptation plan; focus on sea-level rise, heat waves, and extreme storms; engage all levels of government" (p.9).

Planning as a tool is also considered alongside adaptation in the report's recommendations:

> "Include climate change in all planning and review: Include in all formal development review and capital planning; identify "no-regrets", "low-cost", and "wait-and-see" strategies; begin adaptation planning case studies" (p.9).

> "Use land use and transportation planning to enhance Boston's economic, social, and cultural richness and its urban density, walkability, and transit system as an important regional climate mitigation strategy" (p.25).

> "Boston needs a way to monitor whether the effects of climate change are likely to exceed projections previously used for planning purposes." (p.40).

Adaptation is viewed in the report as 'good planning', and involved understanding the risks Boston is facing, as well as understanding what actions can be implemented to address them. 'Adaptation planning' as a phrase is utilised, and suggests that in this capacity, planning should "address the health, economic, and social consequences of climate change impacts." and "special attention to those of its members who are more vulnerable because of lack of resources, poor health, age, or other reasons" (p.39).

The plan looks beyond the capacity of the city government;

> "Boston's planning and assessments should identify adaptation measures that are beyond the capability or authority of city government, and Boston City Government should pursue those measures at the appropriate level of authority." (p.40).

It also recognises that the city is one of the foremost in the USA in terms of climate action, and urges increased long range planning and cooperation across governance levels and city stakeholders, to achieve prioritisation and develop benchmarks upon which the city can continue its resilience journey.

2011, 2014 and 2019 Climate Action Plan Updates

Subsequently, after the 2010 release of *Sparking Boston's Climate Revolution* the original 2007 Climate Action Plan was updated in 2011. *A Climate of Progress – City of Boston Climate Action Plan Update* (ACP-CAP) was the next instalment in Boston's climate action and resilience planning journey; the Climate Action Plan has been updated regularly as intended, with updates released in 2014 and more recently in 2019. Alongside this, exists the Climate Ready Boston initiative and associated plans that have been published since current Mayor Martin Walsh came to power. The two initiatives complement each other and whilst the terms adaptation and mitigation, in relation to climate change and resilience, are used in both factions, it

can be broadly stated that each initiative concentrates on one side of climate action. The Climate Action Plans focus more on reducing emissions and ensuring that the city of Boston reduces its negative impacts on the climate, the main priority is mitigation. The Climate Ready Boston Initiative focusses on preparing the city for the impacts of climate change, as such the priority here leans more towards adaptation.

The ACP-CAP of 2011 builds on its 2007 predecessor; it is here that resilience first emerges as a concept for the City of Boston (related to mitigation):

> "The goals of climate action are to reduce contributions to the causes of climate change, reduce vulnerability to the consequences of climate change, and…enable Boston to thrive economically while becoming more resilient and sustainable." (p.4).

The 2011 update shares much with the 2010 SBCR; planning is still being discussed as a tool to use within climate action:

> "City Government should immediately incorporate projected climate change into all planning initiatives and activities" (p.5).

This concept is built upon and the idea of multiple city departments coalescing their expertise to produce a city-wide climate plan is proposed. Building upon this notion, a number of interviewees considered cross-departmental and city working, and the siloed nature this may bring. An interview with a BPDA Planner hinted at the increased workload that city departments are facing; the push from the Mayor and the City in the direction of climate action and resilience planning is "*adding pressure on top of existing busy jobs*", there is more demand for climate focussed activity, however no more resources are being provided. Furthermore, lack of communication was provided as an example of siloed working, it was highlighted that communication issues with the Department of Emergency Management have led to evacuation routes clashing with areas that are at a high risk of flooding. The exact reason for this miscommunication was unknown; "*perhaps they are too busy?*". Nonetheless, a more positive facet of siloed working was also discussed, "*it is*

forcing people and groups to interact, that may not normally interact, as climate change is such as broad, far-reaching issue that covers much of the city, from obvious things to more specific issues".

Focussing on urban planning specifically, planning skills are shown to be used in terms of zoning and building code in particular. The BPDA, began working towards ensuring that new developments in the city "comply with applicable State and City strategies for addressing sea-level rise and climate change." (City of Boston, 2011, p.11). In an interview with a BPDA planner however, it was acknowledged that currently, resilience is not incorporated into building code, however new developments go through a "*rigorous process*" before being built. It was added that "*most new developers are on-board with incorporating resilience*", and more difficulty stems from modifying old buildings, a particular challenge in Boston. Another challenge that materialises here is a result of the building development process. Projects that have existed in the development pipeline for many years do not incorporate more recent resilience or climate action precautions. Despite this, the BPDA developed a *Climate Change Resiliency and Preparedness policy related checklist*, for future developments that helps to "analyse the impacts of future climate conditions and to incorporate measures to avoid, eliminate or mitigate greenhouse gas emissions and impacts related to climate change in project planning, design and construction" (BPDA, 2017). An updated version of this, the *Climate Resiliency – Review Policy Update*, was created utilising the Boston Research Advisory Group (BRAG), and focusses more on engagement and hazard preparedness, including the provision of an online reporting tool for citizens and a 'Flood Hazard Area mapping tool'. The utilisation of a group such as BRAG further serves to exemplify cross-departmental working and beyond. A planner at the BPDA discussed the BRAG, commenting that the group is "*fundamental*" and much of the data they use comes from "*established institutions in the city*". It is here that the involvement of institutions beyond City organisations is apparent; like Anchorage, academic institutions are relied upon to contribute research and data to the resilience 'cause'. Reliable and relevant data availability is undoubtedly a critical cornerstone of climate action. Academic partnerships in the city are also important for creating data to contribute to the planning process. Academic institutions such as the Sustainable Solutions Lab at the University of Massachusetts, Boston (UMass)

contributed to planning efforts, providing technical and scientific expertise. Much of the data attributed to BRAG is produced by academics at MIT, Boston University and UMass. The data is shared across city departments and other municipal stakeholders may also have access to the datasets, "*ensuring everyone is on the same page*" (Interview with a Climate Ready Boston Representative). Nonetheless, a lack of relevant data can still hinder planners and related stakeholders; it was noted by a Climate Ready Boston representative that some of the data is too broad and more granular level data would be welcomed, for example, if tree canopy cover needs to be increased, it would be helpful to be able to identify the need at a street-level. This was identified as another way that communication issues and prioritisation of efforts can burden outcomes and partnerships.

In an interview with an MIT Sustainability Officer, it was commented that academic institutions working alongside the City of Boston allows for "*town-gown barriers to be broken down*" and also strengthens Boston's relationship with its close neighbouring cities such as Cambridge. The interviewee stressed the need for cities to be viewed as systems; "*resilience can't be achieved wholly unless it is broadly applied, making one or two buildings completely resilient is impossible, if there was a flood they would be completely cut off unless the system as a whole is resilient*". A BPDA planner built upon the link between city institutions and academia, suggesting that the partnerships serve to "*act as benchmarks to provide internal consensus within the city*", and may be a way to address siloed working within the resilience process.

Overall, the CAPs indicate the start of a more comprehensive, city-wide approach to climate action. The 2011 report ends by reinstating the conclusion of the 2010 SPCR report:

> *"*there is much to do… In the urgency of this moment—as in other tumultuous and historic moments—Boston stands ready to act." (p.42).

This sentiment appears to have been taken seriously by the incoming (and current) Mayor, Martin Walsh, who replaced Thomas Menino in 2014, the same year that the 2014 Climate Action Plan update was released and a renewed effort to address

Boston's climatic concerns was catalysed. The Walsh administration continued the process of updating the Climate Action Plan and 2014's version was released 6 months after Mayor Walsh took office.

'*Greenovate Boston 2014 Climate Action Plan Update'* (GB-CAP) is the first update that represents the current form of Boston's Climate Action plan initiative and introduces the Greenovate initiative, which focusses more heavily on citizen involvement and outreach. Community engagement is advocated across many of the climate related plans in Boston. A BPDA planner acknowledged that "*the Boston community are accepting and have responded well to climate related planning*" adding that they "*expected a bigger backlash*" when the Climate Ready Boston report was released as some of the climate projection data was "*quite dramatic*". A Climate Ready Boston coordinator interviewed said that whilst the distinct neighbourhoods of Boston have different levels of involvement and engagement with City operations and planning, the specific Greenovate programme acts as the "*communication and outreach arm*" for the Climate Ready Boston programme in particular, and also offers training for local leaders in the various neighbourhoods. The Greenovate programme intends to sustain public engagement with Boston's climate action agenda as it continues its resilience journey.

In between the 2011 and 2014 updates, Hurricane Sandy hit the East Coast of America in 2012. Whilst Boston did not suffer such devastating consequences as New York further down the coast, the glimpse of what the future could hold added to the climate action impetus for the city and Mayor Walsh. The Mayor states in his opening address that "Boston must focus its collective will on making sure we do everything possible to be ready" (p.3), commenting that the luck Boston received when Sandy hit is not enough to rely on for the future.

Unlike more common approaches such as adaptation or mitigation, 'climate preparedness' is the theme of the 2014 update, which incorporates resilience into its definition:

> "Also known as…climate resilience, climate preparedness involves modifications that can be made to the built environment…Furthermore, preparedness applies to the social and economic environment" (p.10).

As well as preparedness, the 2014 update also focusses on filling knowledge gaps and assessing vulnerability through monitoring and assessment. By understanding trends, it is stated that climate mitigation can be pursued more thoroughly as more information is gleaned. It is also suggested that planners may use this data to aid their efforts to account for more long-term, end-of-century planning:

> "**2.31** Provide accessible climate data and projections Ensure that all municipal offices and the community have up-to-date climate change projections." (p.64).

Planners incorporating climate preparedness into their processes, as mentioned in the original 2007 and updated 2014 versions, is still identified as a priority, however, its status remains 'in-progress' as siloed working conditions hinder advancement and specific planning actions are not always clear;

> "Under the CAP Update, this integration will be continued, strengthened, and expanded, with a goal of ensuring that every opportunity to improve Boston's preparedness for climate change is exploited" (p.60).

The 2014 update goes beyond planning as a tool, suggesting that active partnerships in the city must be pursued as well as planning documents to ensure real progress is made. The plan then states that partnerships and connections beyond the city are important, committing to:

> "Create a formal mechanism for coordination and alignment of state, regional, and city climate planning." (p.75).

The 2014 update sets out the most ambitious climate actions for the city since its original conception in 2007. The plan is supported by the Climate Ready Boston Initiative (discussed later), as the two initiatives run parallel to address climatic

issues in the city. The most recent update of the Climate Action Plan was released in 2019.

Since 2014, as stated in the *City of Boston 2019 Climate Action Plan Update* (CB-CAP, 2019), Boston was ranked the most energy efficient city in the United States, and was awarded the National Planning Achievement Award for Resilience in 2019. The city also experienced record-breaking extreme weather events in that time;

- July 2019: Boston's hottest month since records began in 1872.
- April 2019: Highest rainfall in 82 years.
- January 2018: 'Bomb Cyclone' resulting in the highest harbour water level since 1921.
- Winter 2015: Highest snowfall since records began in 1872.

The 2019 update combines mitigation and adaptation, acknowledging the need for urgent action. Progress on integrating climate preparedness into city planning processes has been made; a number of documents produced under the Climate Ready Boston Initiative (discussed later) focus on planning for resilience, such as guidelines for flood resilience. Furthermore, the BPDA are working to develop new green-zoning processes and have adopted a smart-utilities policy.

The BPDA, and planning as a tool for resilience, are utilised particularly in the 2019 update as a way to reduce carbon emissions in the city through zoning and regulation:

STEPS	TIMELINE	IMPLEMENTERS & PARTNERS
1. Require that building developers submit a *Carbon-Neutral Building Assessment* as part of Article 37 zoning review requirements	2019	BPDA, City
2. Promote new ZNC buildings in the Boston area to improve knowledge of ZNC costs and best practices	Ongoing	BPDA, in partnership with developers, architects and engineers, academic institutions, energy-focused community organizations
3. Launch technical analysis and public process to: • Assess the feasibility of ZNC standards for building types and develop timeline for implementation • Assess on-site renewable energy practices and standards and procurement of off-site renewable energy • Explore extending green building requirements to small project review (developments between 20,000 and 50,000 square feet) • Develop zoning recommendations for a ZNC standard	2019-2020	BPDA, City, technical experts, industry stakeholders, utilities, community groups
4. Enact new zoning requirements and timeline for implementation	2020	BPDA
5. Evaluate the creation of a carbon linkage fee	Starting 2020	City, BPDA
6. Communicate, educate, and oversee compliance of ZNC building requirements	Starting 2021	BPDA, City, industry associations, community groups

Figure 22. *2019 Climate Action Plan Update (City of Boston, 2019)*

The 2019 update is the most recent document in Boston's comprehensive climate action and resilience planning journey. The *Climate Action Plans* in their various forms served as overviews for all climate action occurring in the city. The Climate Ready Boston initiative, launched by former Mayor Thomas Menino in 2013, takes comprehensive responsibility for climate action in Boston, building upon the Climate Action Plans to develop policies and initiatives to address the threats of climate change in Boston.

Climate Ready Boston: 'Meeting Climate Change at the Coast'

Phase	Plans	Emphasis
Climate Ready Boston – Long-Term Planning, Vulnerabilities & Resilience	Climate Ready Boston: Municipal Vulnerability to Climate Change (2013)	Sea level rise identified as the key threat to the city, preparedness remains as a priority. More comprehensive use of resilience in terms of planning, urban design and engineering: *'Resilient infrastructure'* A move to look towards long-term vulnerabilities and solutions: *'Vulnerability assessment'* Specific planning actions and multi-departmental working to address sea level rise: *'Integrated solutions'* Continued focus on citizen engagement: *'Connected communities'*
	Climate Ready Boston (2016)	

Table 14. *Long-term planning, Vulnerabilities and Resilience*

Climate Ready Boston is the City of Boston's initiative to prepare for both the long and short-term effects of climate change. Launched under the Menino administration, the initiative was continued by the Walsh administration and now comprises a major city-wide report and its update, as well as a set of design guidelines:

- *Climate Ready Boston: Municipal Vulnerability to Climate Change* (2013)
- *Climate Ready Boston* (2016)

Climate Ready Boston also outlines programmes in the report, that do not have separate documents, such as the *Resilient Boston Harbor initiative*.

The 2013 *Climate Ready Boston: Municipal Vulnerability to Climate Chang*e sets out the city's initial approach to the Climate Ready initiative. It is the result of work

completed by the former Climate Preparedness Task Force and has the overarching aim to:

> "help make Boston the most prepared and resilient city in the country." (p.4).

The plan particularly focusses on the impacts of climate change upon the city of Boston, primarily sea level rise as a threat. Climate action and resilience continues to be attempted to be mainstreamed throughout the plan and subsequent planning process:

> "incorporate climate change into all municipal and community planning, projects, permitting, and review processes' (p.10).

Urban planning as a tool to build resilience and propel climate action is seldom referred to explicitly. Broadly discussed within the 'Transportation and Water Infrastructure' section, planning becomes most relevant in the 'Neighbourhoods' chapter where:

> *"*Through its planning… the City plays an important role in ensuring all Boston buildings and neighborhoods are prepared for the impacts of climate change." (p.24).

Planning also falls under the guise of emergency or disaster preparedness in neighbourhoods, with a specific focus on economic preparedness and recovery. Overall, the document is only 29 pages long, with heavy emphasis on economic recovery and related challenges. The policies proposed are broad and accountability is ambiguous.

Climate Ready Boston 2016

In comparison, the 2016 version of the Climate Ready Boston report is 397 pages long, with supplementary documents covering specific Boston neighbourhoods:

- *Coastal Resilience Solutions for East Boston and Charlestown - Final Report* (City of Boston, 2017)

- *Coastal Resilience Solutions for South Boston - Final Report* (City of Boston, 2018)

The report is divided into four components, one of which is 'Climate Resilience Initiatives'. In the report, it is recognised that Boston's location is favourable for a thriving city, nonetheless, the coastal expansion conducted to help the city grow has also made it especially vulnerable to climate change. The report builds upon the recommendations of the Climate Action Plan and its updates to address these vulnerabilities and climatic challenges.

A comprehensive vulnerability assessment was carried out for the purpose of the report. The prevalence of extreme temperatures and increased sea level rise are noted as particular threats to the city, along with extreme precipitation and coastal storms causing severe flooding.

It appears resilience is a broad term applied to many facets of the Climate Ready Initiative, covering climate readiness or preparedness alongside economic threats, community involvement, engineering and multiple other considerations. Furthermore, the resilience initiatives are also intended to cover the variety of 'climate hazards' noted above.

Whilst 'planning' is referred to abundantly throughout the documents, planners are mentioned only once. In the initial mayoral address at the beginning of the document it is noted that planners, alongside scientists, engineers and designers were consulted throughout the process of developing the document, nonetheless their involvement beyond this point is ambiguous. The Boston Planning and Development Agency is referred to via the use of somewhat aspirational language.

> "The BPDA should engage in conversations with the development community to develop guidelines" (p.106).

> "The BPDA should evaluate the opportunity to reinforce these design guidelines through changes to the Boston Zoning Ordinance." (p.127).

Furthermore, specific initiatives proposed also make use of the ambitious yet equivocal language, indeed Van Den Burg and Keenan, 2019 comment that "the Climate Ready Boston plan operates in generalities" (p.93):

#	INITIATIVE	RELEVANT REGULATION OR PROCESS	RECOMMENDED CHANGES
9-1	**Establish a planning flood elevation to support zoning regulations in the future floodplain**	Boston Zoning Code	Establish a **Planning Flood Elevation** for all buildings within the future 1 percent annual chance flood zone.
9-2	**Revise the zoning code to support climate-ready mechanical systems**	Boston Zoning Code	Using the **Planning Flood Elevation** (Initiative 9-1), amend provisions of the Zoning Code (allowable height, bulk, and use) to ensure they promote and do not discourage **climate-ready new construction and retrofits.**
9-3	**Promote climate readiness for projects in the development pipeline**	Development Approval Process	Offer developers with already-approved project an opportunity to adopt **climate ready new construction standards** (Initiative 9-2) based on the **Planning Flood Elevation** (Initiative 9-1) without needing to undergo a completely new City review process.
5-1	**Establish Flood Protection Overlay Districts and require potential integration with flood protection systems (see Protected Shores layer, p.98)**	Boston Zoning Code	Establish a **new overlay district in potential flood protection locations** and require that development proposals do not prevent the **future creation of flood protection infrastructure.**
9-4	**Pursue state building code amendments to promote climate readiness**	Massachusetts Building Code	Advocate to the state to adopt a new **minimum elevation for building mechanical systems** based on the **future 1 percent flood elevation** at the end of a system's design life.
9-5	**Incorporate future climate conditions into area plans**	Strategic Planning Areas, Planned Development Areas, Municipal Harbor Plans, and Institutional Master Plans	**Incorporate future climate considerations** into major neighborhood planning efforts.

Figure 23. *Climate Ready Boston (City of Boston, 2016)*

The supplementary documents, *Coastal Resilience Solutions for East Boston and Charlestown - Final Report* (2017) and *Coastal Resilience Solutions for South Boston - Final Repo*rt (2018), were produced in line with the Climate Ready Boston imitative and follow a similar format to the 2016 report at a more granular, neighbourhood level. These documents offer a more detailed insight into the resilience initiatives proposed and were led by the BPDA; produced as "a direct response to recommendations in the report that the City …develop local climate resilience plans in vulnerable areas to support district-scale climate adaptation" (City of Boston, 2018, p.14). Both documents offer 'planning and policy solutions',

primarily focussed on sea level rise and flood control, as well as, “continued engagement” with Bostonian citizens (City of Boston, 2017, p.15).

The solutions proposed in the two documents are at a neighbourhood level; composed after comprehensive district-level analysis of climatic threats, particularly flood risk. From this, planning implications were identified, such as the requirement for increased levels of flood protection and any potential impacts upon transportation and evacuation routes in the city. According to the two documents, the ‘planning approach’ was divided into three layers; near, mid and long-term planning. Near term refers to urgent action that needs to be taken. Mid-term planning equates to actions that must be implemented in the near-future, or next 25 years at the latest, in order to mitigate the effects of climate change and flood risk. Finally, long-term planning considers the future up to 2070. This approach employs a vision to adapt the city to enable its survival in the face of longer-term, forthcoming climatic challenges:

> “Integrated solutions can provide multiple layers of protection from sea level rise and coastal floods, in concert with broader climate resilience measures” (City of Boston, 2017, p.28)

Much emphasis is also placed on urban design and planning in relation to reducing flood risk. Interventions such as watertight buildings and tidal barriers are incorporated into mixed-use solutions with greenspace to ensure year-round use and benefit citizens. During an interview with a BPDA planner, resilience in this context was discussed; “*different areas have different approaches, but in particular there is a focus on coping before, during and after, and particularly social resilience*”. The interviewee then commented that “*resilience has inspired a new mindset*”. The focus for planners in Boston when incorporating resilience into their practice is now more “*nature based*”. Hard engineering initiatives such as sea walls are not favoured, requiring heavy maintenance and specific knowledge. A proposal for a 3.8 mile barrier wall around the harbour was scrapped after climate science researchers at the University of Massachusetts Sustainable Solutions Laboratory, who work alongside the City of Boston, suggested instead that the money budgeted should be funnelled into neighbourhood level protection. Major infrastructural plans such as the proposed

wall can be seen as a contentious issue for planners in the city, due to a reluctance to repeat 'Big Dig' conditions; the sea wall was predicted to cost upwards of $12 billion. Neighbourhood level, "*soft*" approaches avoid planners and other stakeholders "*putting all their eggs in one basket*". Softer options such as coastal parks offer a more "*hands-off approach that has co-benefits for neighbourhoods*". In short, a coastal park that can absorb the impacts of coastal flooding can also be used for the benefit of local communities when the flooding threat is absent, whereas a sea wall has a more rigid, singular purpose. Together these proposed parks will contribute to the Emerald Necklace, where 122 tidal acres will be restored to protect the city, anticipating increased flooding whilst providing recreational opportunities for local residents. Whilst the necklace park system itself has existed since the 1860's, the project has still yet to be completed, due to funding restraints, jurisdiction clashes with neighbouring cities and invasive plant species requiring massive conservation efforts (Eisenman & Carr, 2019).

This project is similar in approach to the proposed 'Big U' in New York, however at a less disruptive scale; enhancing and modifying existing parks. Mayor Walsh, in an interview with the Boston Globe in 2019 stated; "I'm not sure if any other city in America has quite planned this way…they have after the fact. New Orleans had to plan after Katrina, but we want to get ahead of this game and plan before something happens like that". The example below shows the proposal for Joe Moakley Park in South Boston, including the volume of coastal flooding the area could face after a coastal storm by 2070 with a 36-inch rise in sea level, as well as the intended integration of flood measures and public space as part of the Emerald Necklace.

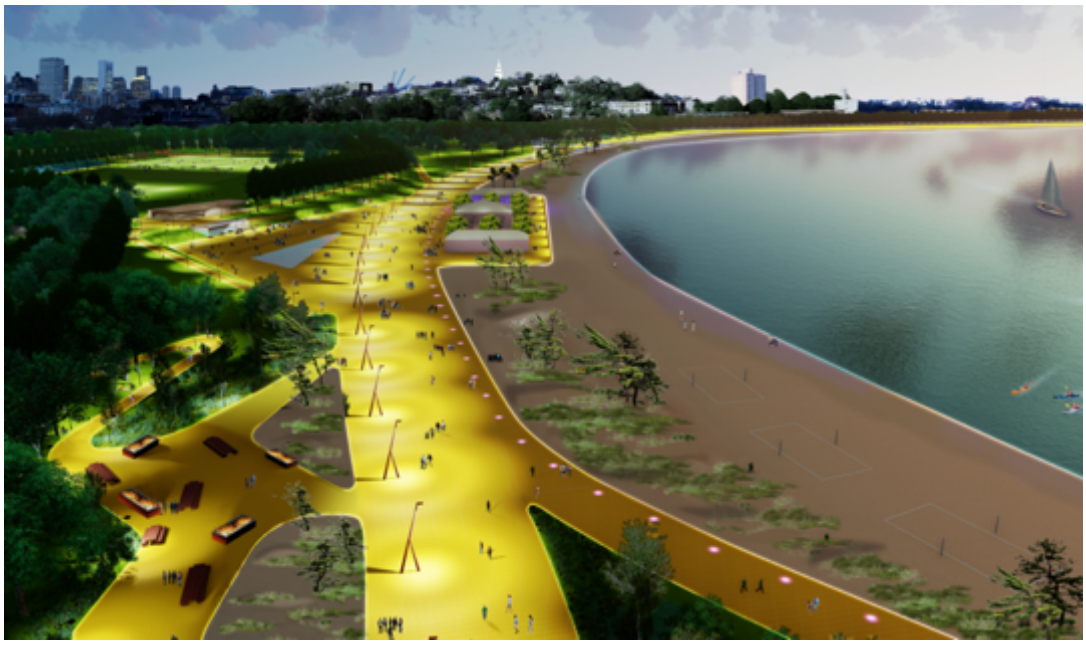


Figure 24. *Moakley Park Vision Plan (City of Boston, 2019)*

Figure 25. *Moakley Park Vision Plan - Potential Sea Level Rise (City of Boston, 2019)*

Moakley Park is Boston's largest waterfront park and is subject to regular coastal flooding, rendering it regularly unusable. A partnership between the BPDA and Boston's Parks and Recreation and Environment Departments as well as a number of private design and architecture firms has produced a resilience vision for the park. According to the City of Boston's website (as of November 2020) the project status is: "Vision completed (now in design phase)" (City of Boston, 2020). The plan envisages a mixed-use recreational area for local residents, incorporating sports

venues such as baseball fields, beach volleyball courts and a sledding hill, alongside cafes, community buildings and an adventure playground. Resilience in the park's context translates to an adaptive and flexible space, alongside "planning resilient infrastructure to protect the neighborhood from future climate risk" (City of Boston, 2020). Practically, the combination of a beach, dune restoration, a promenade, lawn and slope, in front of the main park, provides flood protection through soft, blue-green techniques, allowing the space to be useable when flood defences are not required. Linking to Boston's involvement with the 100 Resilient Cities programme, equity is also incorporated into the resilience vision, by aiming to ensure accessibility to the park from across the surrounding low-income neighbourhood. The planning and design process for the park is long-term, beginning in 2016 and aiming to be competed in around 2025; no ground has been broken as yet. This park example, whilst still in the design stage, signals the shift of planners and related departments and stakeholders, as a whole, towards a more resilient outlook across the city; "*whereas previously a park development, such as Moakley Park, would have just been about creating vibrancy in the neighbourhood, resilience has now been incorporated into the plans*" (BPDA planner interview).

When meeting issues at the coast however, challenges can arise, requiring the overcoming of siloed and disjointed working patterns amongst stakeholders, both public and private, as well as local communities. In a speech regarding the Boston Harbor Now initiative in 2017, Mayor Walsh acknowledged these challenges, that emerge when dealing with coastline issues; "Multiple property owners, multiple jurisdictions, funding needs…it's a shared resource and a shared obligation" (Boston Globe, 2017). Furthermore, the waterfront of Boston is prime real estate, causing tensions between the need to stay safe and resilient and the desire to develop the most profitable parts of the city. A 2020 Boston Globe article highlighted that whilst initiatives such as Moakley Park will benefit local, low-income citizens, Boston's overarching approach to resilience; focussing on flood-proofing and flood protection will serve to encourage the development and gentrification of the waterfront, citing the phrase 'green gentrification' (Humphries, 2020). Green gentrification here concerns the notion that gentrification will occur following the "creation or restoration of an environmental amenity" (DeSena, 2012, p.121). The potentiality for this to occur in Boston is high. As mentioned before, the Seaport District of South

Boston is a good example; one of the lowest lying areas of the city, the former industrial area serves as flood 'corridor'. The area however has seen rapid green gentrification and financial input in recent years, such as the relocation of General Electric's world headquarters and Gillette's US headquarters, alongside high-end apartment developments, as well as shops, bars and restaurants. This development has followed green building standards, seen the building of waterfront parks similar to Moakley Park and pushed 'greening efforts' as a way to attract residents and investment, simultaneously creating inequality amongst lower-income communities in the area, and unnecessarily raising the risk of climate change impacts and undermining resilience efforts in the city.

Using parks and greenspaces as facilitators of resilience is an attractive and doubly beneficial option, also serving to act as 'flagship' type projects that draw attention to resilience efforts. The Moakley Park plan has been generally supported by local residents, although some are concerned that the areas around the park have been overlooked; if flooding occurs, the impact will not stop at the arbitrary boundary of the park (Zhang, 2019). Furthermore, the overarching plan to transform parks around the Emerald Necklace has raised concerns that it is overambitious. Like New York's Big U project, the process of completing high-profile resilience projects is long and complicated, leaving areas vulnerable to climate change in the interim period between design and implementation. Complication regarding funding and the task of co-ordinating often siloed stakeholders to complete large-scale projects leads to delays.

Overall, the two documents (*Coastal Resilience Solutions for East Boston and Charlestown - Final Report* and *Coastal Resilience Solutions for South Boston - Final Report*) are the first neighbourhood-level plans focussing on flooding, sea-level rise and coastal resilience, within Boston's overall and ongoing Climate Ready initiative to prepare for climate change in the city. The Climate Ready Boston programme continues in the city, with a large number of initiatives. Producing a large amount of climate action and resilience efforts; plans & documents tend to overlap and whilst there is a flood of proposals, policies, plans and ideas, the accountability can be vague and the bridge between ideas and implementation unsure.

Citywide Plans

Phase	Plans	Emphasis
Citywide Plans – Citizen Engagement, Growth & Mainstreaming	Imagine Boston 2030 (2017)	Imagine 2030): first citywide plan in 50+ years Finding a balance between encouraging growth in the city and citizen enjoyment with adaptation and climate resiliency: *'Healthy Environment'* 100RC (ran alongside Climate Ready Boston) applied a resilience 'lens' to many issues within Boston beyond climate change i.e. race: *'Social and economic resilience'* Links back to mitigation and emission reduction, as well as preparation: *'Accelerate carbon neutrality'* Moving to the future; mainstreaming resilience and planning: *'Significant strategic planning'*
	Boston's Preliminary Resilience Assessment (2016)	
	The Blueprint: A preview of the Principles & Framework for Boston's Resilience Strategy (2016)	
	Resilient Boston: An Equitable and Connected City (2017)	

Table 15. *Citizen engagement, growth & mainstreaming*

Imagine Boston 2030

Imagine Boston 2030[5], was published in 2017. The document is Boston's first city-wide plan produced in over 50 years . The plan ties into the Climate Ready Boston initiative; "we've made climate resiliency central to all our major planning efforts, including Imagine Boston 2030" (p.2).

[5] Another document *GoBoston 2030* was also published, focussing solely on transportation in the city. Furthermore, Imagine Boston 2030 was also produced with the Rockefeller 100 Resilient Cities content in consideration.

A broad goal of the plan is to "promote a healthy environment and adapt to climate change." (p.14), as well as to "Create a waterfront for all Bostonians that is climate-resilient" (p.15), and to encourage "Development planning that supports a district-wide resilience strategy" (p.35). The city-wide plan comprises a range of urban matters for the city, thus neither climate change nor resilience are the sole foci of the document or the policies proposed. Preparing for climate change is an aspiration alongside economic growth, supplying affordable housing and promoting a more equitable city. Again, sea level rise is considered the biggest climate change related threat to the city, in terms of physical and economic damage, as well as the social concern of how particularly vulnerable populations may be affected. With a prevailing theme of 'growth', Imagine Boston 2030 instead relies upon the aforementioned climate specific plans to delineate how the city will cope with climatic shocks and stresses.

Rockefeller 100 Resilient Cities

Parallel to the Climate Ready Boston initiative and the City of Boston Climate Action Plan updates, Boston also became a member of the Rockefeller 100 Resilient Cities programme in 2014; planners and other built environment professionals in the city base their resilience definition on the Rockefeller definition, with added focus on citywide mitigation and adaptation. Part of this included employing an official 'Resilience Officer' for the city in 2015. The city has subsequently produced three corresponding documents jointly with the Rockefeller Foundation and the Mayor's Office of Resilience and Racial Equity:

- *Boston's Preliminary Resilience Assessment* (2016)
- *The Blueprint - A Preview of the Principles & Framework for Boston's Resilience Strategy* (2016)
- *Resilient Boston - An Equitable and Connected City* (2017)

Resilience, for the purpose of this project, and in many urban planning contexts, focusses on climatic shocks and stresses and the multiple threats and recovery challenges that climate change poses to cities. For Boston, as part of the 100 Resilient Cities programme, resilience is predominantly linked to racial and

economic inequality, with a heavier focus on social justice and equity, rather than climatic resilience. The Mayor's office of Resilience and Racial Equity has "focussed on social and economic resilience in a City affected by historic and persistent divisions of race and class", whilst keeping "an eye toward potential shocks the City may be exposed to" (City of Boston, 2019).

According to Boston's page on the 100 Resilient Cities website, Boston's critical resilience needs to encompass a lack of affordable housing and lack of educational opportunities for minority communities, which serve to divide the city "along racial and economic lines" (Rockefeller Foundation, 2016).

Boston's Preliminary Resilience Assessment (2016)

Boston's first resilience-oriented document under the Rockefeller 100 Resilient Cities banner, published in 2016, is the 8-page, *Boston's Preliminary Resilience Assessment: The Beginning of a Shared Journey to Healing, Connections, and Actions,* following the successful application to the Rockefeller 100 Resilient Cities programme and the appointment of the City's first Resilience Officer. The assessment provides Boston's official definition of resilience:

> "Urban Resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt and grow no matter what kinds of chronic stresses and acute shocks they experience." (p.2).

Furthermore, the intent to mainstream resilience is clear;

> "Resilience must permeate every facet of our work so that all Bostonians can thrive, even in times of crisis." (p.2).

In terms of urban planning as a tool to build resilience, the assessment adumbrates the notion that long-term resilience planning initiatives will be integrated and implemented across major policy areas. Furthermore, the Walsh administration's purported commitment to planning for resilience is reinforced through the discussion of "*ambitious initiatives*" such as Climate Ready Boston and *Imagine Boston 2030.*

In this preliminary assessment, aspirations are set out. One such aspiration directly focusses on resilience planning (although not specifically the practice of urban planning): “Adopt a Resilience Lens for All Planning, Policies, and Practice .” (p.6).

This aspiration considers questions including how to integrate resilience into other plans, and how resilience is adopted by urban governance policies and non-governmental partners. Furthermore, the city’s budget is considered with regards to the scope of resilience incorporation.

The Blueprint: A preview of the Principles & Framework for Boston’s Resilience Strategy (2016)

Following the publication of the preliminary assessment in April 2016, the city then published *The Blueprint: A preview of the Principles & Framework for Boston’s Resilience Strategy* in November 2016, ahead of publishing the complete and final version of Boston’s resilience strategy. The 12-page Blueprint builds upon the preliminary assessment, and sets out 4 key resilience visions for the city.

Vision 4, ‘Connected, Adaptive City’ and its sub-goals in particular focusses on climatic resilience and the extreme-ing nature of Boston, particularly preparing communities of colour for climate change and improving emergency response and citywide resilience:

> “GOAL 4.2: Prepare for the impacts of climate change and other threats while accelerating sustainable infrastructure, environment, and communities.
>
> GOAL 4.3: Improve the collaboration of partners working in Boston communities to address climate change and other emergencies.” (p.8).

Again, a focus is put upon mainstreaming resilience and embedding it within city plans, as the city is currently “*undergoing a period of significant strategic planning”* (p.9). The document ends with a Call to Action, the impetus is on the city as well as its residents to connect and collaborate to create and strengthen resilience in Boston.

Resilient Boston: An Equitable and Connected City (2017)

Boston's official resilience strategy, in partnership with the Rockefeller 100 Resilient Cities programme, was released in July 2017, building on the work of the previous two documents as well as ongoing engagement with city departments, stakeholders, citizens and the city's Chief Resilience Officer. The strategy aims to promote "resilience-building actions and initiatives…to reduce the impact of acute shocks and chronic stresses" whilst also working to "improve outcomes for individuals, the physical environment, and the economy" (p.15). Lingering trauma and a fractured foundation are cited as justifications for Boston's pursuit of resilience, along with a considerable potential to overcome systematic racism to work towards equity, justice and social cohesion.

The strategy expands upon the four visions presented in The Blueprint. As discussed above, Vision 4 is particularly focussed on climate resilience, tritely presenting ambitious ideas to build resilience in Boston. Mayor Walsh is quoted acknowledging the challenges Boston faces:

> " Fighting climate change means fighting for all those affected by worsening air quality, extreme heat, eroding coastlines—issues that will continue to impact residents for generations to come." (p.107).

The idea of environmental justice is also introduced here for the first time in Boston's resilience and climate action lexicon. The notion of climate justice links to the strategy's overarching goal of equity, addressing the fact that:

> "Communities of color are often disproportionately impacted by environmental shocks and stresses and are less likely to have access to the political power necessary to rectify these disparities" (p.108).

The prodigious task of overcoming racial inequality whilst simultaneously tackling climate change in Boston is, whilst admirable, a somewhat exorbitant endeavour. The language of the strategy is aspirational and solid policies and solutions are

lacking. For planners and the planning profession, ideas presented in the strategy lack tangibility:

> "Develop neighborhood-based climate resilience plans that benefit households citywide and promote environmental justice." (p.116).

> "Build the capacity of communities, non-profits, small businesses, and public health and healthcare infrastructure to prepare together for emergencies and disruptions." (p.126).

The BPDA is often listed as an 'implementation partner' but specific planning skills and interventions are not outlined, leaving responsibilities and accountabilities ambiguous. In an interview with a BPDA planner, Boston's relationship with the Rockefeller 100 Resilient Cities programme was only briefly discussed, they commented that the resilience plans produced through this partnership were not utilised by the city planners and suggested only that these plans "*may be used in the future to provide a framework regarding social vulnerability and equity issues related to climate planning in the city*". Overall, the strategy covers an array of deep-rooted urban issues that Boston has faced over time. It is therefore unsurprising that climate change is not the sole focus, and granular planning approaches are missing. An air of equivocalness in the discourse could be explained by the additional climate-related work the city is undertaking; the work produced via the 100 Resilient Cities programme occurred in parallel to the Climate Ready Boston work, and the Climate Action Plan updates that the city was also working to produce.

In early 2019 the 100 Resilient Cities programme was disbanded by the Rockefeller Foundation and Boston's partnership with the Rockefeller Foundation ended in mid-2019, when Rockefeller terminated the funding for the programme. Referring back to the appointment of the Resilience Officer in 2015, a Boston Harbor Now consultant stated that the original Chief Resilience Officer for Boston Atiya Martin, appointed in 2015, was heavily focussed on the pressing issue of racial equality and conducted large scale community involvement; in a speech in 2016, she argued "the people who are suffering the most in day-to-day life are also the people who are suffering the most when there is a disaster" (Boston Globe, 2016). Controversially

and confusingly however, it was revealed that Martin was "*pushed out*" in 2018 and "*no-one is quite sure why*." The interviewee added that "*the new resilience officer is never heard from*". A Boston Globe article from January 2018 reported that Atiya Martin had left the position to "*pursue new opportunities*" (Irons, 2018), but little further information can be found, and the responsibilities and involvement of Lori Nelson, the new Chief Resilience Officer, are difficult to pinpoint. The politicised nature of the 100 Resilient Cities programme and its particular focus on racial equality has thus caused some controversy; looking to the future however, the Climate Ready Boston Coordinator seemed confident that Boston no longer needs support from the Rockefeller Foundation; "*the programme did a good job setting Boston up, and now the city is in a good position to continue without them.*" This may go some way in explaining the less prominent, more mysterious, role of the new Chief Resilience Officer, as this particular arm of Boston's resilience journey winds down. As of January 2020, a new organisation has arisen in place of the 100 Resilient Cities programme; the 'Resilient Cities Catalyst' (RCC). The RCC aims to work with cities to overcome obstacles to resilience and address the risks and stresses that cities to "*realize their collective visions*" (RCC, 2020). It is yet to be seen if the city of Boston will collaborate with the RCC along its resilience journey.

Reflections on Boston's Resilience Journey

Equity: Beyond Climatic Resilience

Resilience and climate action have become the responsibility of a broad range of urban stakeholders in Boston. As noted in Chapter 3, climate change action in the USA has become the responsibility of cities and regions. As with Anchorage, due to attention from the federal level being non-existent in the era of Trump, "*state and city governments are having to step-up so that cities can continue to develop as a vibrant and sustainable city*" (interview with a BPDA planner). Whilst addressing climate change in Boston persists as a priority, allowing the city "*to build a more sustainable, resilient, and healthier city now and for future generations of Bostonians.*" (City of Boston, 2019), resilience as a concept for the City of Boston appears to have a two-pronged existence; preparedness and equity. The commitment to resilience was made concrete in the publication of the resilience strategy in 2017.

Boston has defined urban resilience as a city that; "works to achieve equity: ensuring that vital services reach all residents, including the most vulnerable; providing access to opportunity for all; and actively fostering cohesive communities", based upon the Rockefeller 100 Resilient Cities definition (City of Boston, 2017, p.4). Equity is a principal focus for the city and Bostonians themselves when pursuing resilience; "Achieving citywide resilience means addressing racial equity along with the physical, environmental, and economic threats facing our city." (City of Boston, 2017, p.6). The tagline of the *2017 Resilience Strategy* reads 'an equitable and connected city' (City of Boston, 2017) and the document details the systematic and historic racial tensions that have plighted the city, such as the 'desegregation bussing crisis' and race riots, which endured for nearly 15 years from the mid-1970's to late 1980's. As such, resilience has taken on a more complex and controversial role in the city, being utilised by different stakeholders and departments for differing purposes.

Non-profit Involvement and Influence

Based upon the extensive reading of planning documents, one could argue that the City of Boston is 'oversaturated' with climate-related plans. This has led to a haziness encompassing the delineation of responsibilities and accountabilities across city departments and other resilience stakeholders in Boston. Whilst the top-down mayoral position is strong, the potential for 'too many cooks' spoiling the metaphorical 'broth' of resilience is apparent. Furthermore, for Boston, the inclusion of non-profit organisations in the climate action and resilience planning process is notable, mainly due to the financial contributions and incentives provided. In particular, the Barr Foundation[6] is a major organisation that contributes considerable monetary and consultative resources to the City of Boston. Climate change is a key priority for the Barr Foundation, which prioritises climate resilience grant-making. Notably, the Barr Foundation contributed to the production of the Climate Resilience Solutions documents discussed earlier. Other non-profits include Boston Harbor

[6] The Barr Foundation is a private philanthropic foundation in Boston with over $1.7 billion worth of assets. Established in 1987 by Amos-Barr Hostetter Jr., a telecoms billionaire, the foundation has significant influence upon public policy in Boston, and gives grants in the areas of Arts & Creativity, Environment and Education (Hartigan, 2016).

Now, and the Green Ribbon Commission; a consortium of business owners, and institutional and civic leaders that develop strategies in-line with the city's Climate Action Plan and updates. The non-profits often act as intermediaries between City departments and stakeholders. They also sometime act as official stakeholders. The non-profits can serve to mediate meetings between organisations that may otherwise have remained separate. Furthermore, the expertise provided by members of the non-profit organisations can accelerate the planning process, for example, Boston Harbor Now proposed the *Resilient Boston Harbor* plan which was subsequently officially taken up by the City, and the Barr Foundation contributes funding to the Climate Ready Boston initiative. In addition to this, these non-profits and the City also work alongside private consultancy firms who provide more specific expertise.

The involvement of non-profits in Boston's resilience journey is however contentious. During an interview with a consultant at Boston Harbor Now, it emerged that a consensus on the Barr Foundation and the Green Ribbon Commission is that they are "*on the right path, but funded by old rich white people*". Hinting at a disillusionment with non-profit involvement, a BPDA planner also noted during an interview that non-profits heavily influence the overall climate action and resilience planning agenda for the city, which can cause conflict when organisations also try and push their own agendas. The planner suggested that climate and resilience is becoming a "*popular subject*" in Boston, with a lot of "*well-meaning organisations*" getting involved. However, it was also suggested that "*some initiatives* [by non-profits] *are taking grant funding away from crucial city agencies and may be redundant or overlap existing initiatives or actions*". The involvement of non-profits was described as a "*cottage industry*" in the city.

An interview with a representative from the Climate Ready Boston initiative, which is discussed later, also included views on the role non-profits play within Boston's resilience and climate planning agenda, expanding on the financial implications. However, the interviewee also acknowledged their position is funded by the Barr Foundation, and thus saw the merit of non-profit involvement. Building on the notion of miscommunication, the interviewee speculated that "*everyone is doing what they think is the right thing with regards to climate and resilience, but sometimes these are too different and can clash, people are following different*

trajectories". The term "*constructive partnership*" was offered by an interviewee at the Barr Foundation when discussing the relationship between non-profits and the Climate Ready Boston initiative, then commenting that they "*do not answer to the city*". Non-profits wield financial power, which can further influence, or hinder, climate action and resilience planning and progress. The priorities of organisation such as the Barr Foundation impact upon how funding is assigned, from community projects to research laboratories at local universities such as the University of Massachusetts, Boston. Priorities for the Barr Foundation include: "*Are they raising awareness of climatic issues? Are they mobilising constituencies? Are they catalysing demonstration?*".

The indistinct role of non-profits and their influence upon the City of Boston's agenda and initiatives is difficult to clearly decipher. Differing opinions on the 'usefulness' of non-profit involvement is heavily dependent on the position of the opinion holder. A Boston Harbor Now representative commented that the role of non-profits is to act as consultants, occupying the middle ground, and bridging different groups to overcome fragmentation between stakeholders. Nonetheless, siloes can emerge throughout the planning process amongst non-profits and City departments due to a lack of clarity and understanding of exactly what is expected of each organisation, as well as an unawareness of various counterparts across the spectrum of planning efforts.

More broadly, in the city-wide resilience planning process the involvement of urban planners and urban planning practice in climate action and resilience is not as straightforward as required or hoped. This is made further apparent in Boston, where the BPDA straddles many, sometimes conflicting, obligations. Involvement from other city departments, as well as non-profits, and citizen engagement further muddies the (rising) water. Amongst a range of challenges faced by Boston along its resilience journey, siloed working emerges. Furthermore, academic involvement, lack of data, conflicting priorities and resilience ambiguousness contribute to a range of roadblocks that provide an investigation into the role and capacity that planners have within the pursuit of urban resilience.

Federal Disinterest and Mayoral Power

The initiative taken by former Mayor Menino in 2007 to issue the Executive Order acted as a catalyst for wide-scale climate action in the city and reflects the autonomy that Boston Mayors hold. The Mayoral position is an important part of the urban fabric of Boston; the role wields significant power in the city. As such, change and improvement in the city is reliant on a pragmatic and cooperative leadership approach, whether it be climate related or a different matter. Climate change is a less contested issue in Boston and the current Mayor, Martin Walsh is hailed as a "*North Star"* in relation to his work on climate action and resilience (interview with a Climate Ready Boston Coordinator). Interviews across the spectrum of climate and resilience planning stakeholders in Boston confirmed the crucial role of the Mayoral position and the particular popularity of the current Mayor and his stance on climate change in the city: *"The Mayor is coming around to the idea of climate change"* (Interview with a city planner).

Furthermore, as President Trump withdrew the USA from the Paris Agreement in 2019, responsibility has fallen upon city-level leaders to address climate change in their localities. Mayor Walsh confirmed that despite the withdrawal, he would work to ensure that the city would "*uphold the tenets*" of the agreement to address the "*very real*" threat of climate change (Walsh, 2019). This corroborates opinions that *"The Mayor is becoming increasingly aware of the need to acknowledge and plan for climate change"* (Interview with a private waterfront planner). Climate change denial is much less prevalent in Boston and across the New England area in general, although a representative of Boston Harbor Now commented that disputes occur surrounding the cause of climate change, and more could be done to address this. Boston though, still suffers the same plight of federal disinterest as Anchorage; "*regarding higher levels of power, some state laws are still catching up, meaning that whilst the city may be attempting to implement actions that would be beneficial for resilience, the law doesn't always allow it. And the current presidential situation is no help at this point*". This notion is built upon by a non-profit representative interviewee, who argued that the starting point to approaching resilience is to understand the potential impacts of climate change, and that the climate change denial and knowledge gaps are "*not an excuse*". The interviewee cited the National

Climate Assessment as a benchmark for cities and states to look to. They added that "*climate denial at a national level has spurred on regional and local action*" and "*Boston is a regional powerhouse*" and as such, "*its' resilience is paramount to not only the city but the state of Massachusetts and New England in general.*" However, "*shrinking budgets means balancing the risk of doing something* [and spending money] *with not doing anything and facing the negative consequences*". The financial challenges impact upon the prioritisation of climate action, "*the short, mid and long-term are all considered, and it is also context specific, but the quicker the implementation [and results], the better, as funding requirements want to see results*" (BPDA planner interview). The BPDA planner noted that this contributed to the "*business case*" for resilience, acknowledging that the Greater Boston Chamber of Commerce was "*on board with funding climate and resilience planning*". Furthermore, the Massachusetts Vulnerability Preparedness programme also contributes to climate action at the state-level. The funding quandary is also moderately eased by the prevalence of climate-focussed non-profit organisations working in and around the Boston area.

Beyond the City of Boston itself, there is regional collaboration amongst Mayors in Boston. The Metro Mayors Coalition of Metropolitan Boston (MMCMB) area covers the towns and cities of Arlington, Boston, Braintree, Brookline, Cambridge, Chelsea, Everett, Malden, Medford, Melrose, Newton, Quincy, Revere, Somerville and Winthrop. Founded by the Metropolitan Area Planning Council (MAPC), [who also produced the 2008 '*Metro-Boston* Multi *Hazard Mitigation Plan'* and the 2014 '*Metro Boston Regional Climate Change Adaptation Strategy Report*'], the coalition, "*develops an agenda and action plan focused on the key issues affecting urban core communities*" and "*promotes regional, collaborative approaches and utilizes a wide range of methods to achieve its objectives*". In 2015 the coalition members individually signed the Metropolitan Boston Climate Preparedness Commitment. The Mayors committed to "*collaborate in identifying, evaluating and implementing ways to prepare the metro Boston region for climate change*". The regional transboundary concept promotes "*coordinated visionary action"* and as such regional cohesiveness helps fortify Boston's approach to climate change (MMCMB, 2015). Mayoral power is influential in Boston although still suffers threats of deposition, regarding resilience and climate action. Whilst

strengthened by the regional coalition, leadership overhauls could still have a negative impact on actions taken and implemented by former Mayors and city governments. A Climate Ready Boston Coordinator commented that *"*[The current city government] *are trying to ensure that resilience infiltrates all layers of city administration and beyond, so it is not simply a political thing but becomes a new 'identity' for the city and also the public are fully on board so that if leadership changes, they can press the issue and demand accountability*". The popularity of the current Mayor and the absence of any restrictions on term length may indicate that resilience and climate action in Boston, as a top-down prerogative is in a relatively secure and stable position as a result of strong leadership.

Bostonian urban leadership faces less adversity at the state level when prioritising climate action and resilience. The Commonwealth of Massachusetts produced a report in 2011 entitled the *Climate Change Adaptation Report*, as well as the more recent *Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan* (2018). Furthermore, the Chapter 209 Act of 2018 of the Court of the Commonwealth of Massachusetts was titled, *An Act Promoting Climate Change Adaptation, Environmental and Natural Resource Protection, And Investment in Recreational Assets and Opportunity*. The absence of state-level repudiation of climate issues facilitates easier climate action and resilience planning at varying levels of governance. At the federal level however, Boston is affected in the same way as Anchorage, putting increased pressure on the state, regional and city levels, although benefitting from *"an acceptant leader"* which is key to creating *"real climate action"* (Interview with a Climate Ready Boston Coordinator).

Summary

Boston's resilience and climate action journey in the 21st century began in earnest in 2007 following former Mayor Menino's executive order. Prior to this, the city had taken some action to address emissions, but no comprehensive initiatives or dedicated plans had been developed to address climate change. Following the executive order, the first phase of early resilience and climate action planning in Boston saw mitigation as the first port of call. A focus on adaptation came soon after to join mitigation as the initial two-pronged approach by the city. The beginning of

the Walsh administration in 2014, and subsequent revamp of the BRA into the BPDA in 2016 led to more of a focus on inclusion and community involvement as a new age of planning in Boston was hailed. The second phase of Boston's resilience journey centred more on acknowledging the key vulnerabilities and shifting to a more long-term outlook, as sea level rise was recognised as a major climatic threat for the city. This phase also saw the rise of comprehensive resilience inclusion within major planning documents such as Climate Ready Boston and major initiatives such as the Moakley Park development, signalling a citywide turn to addressing climate change though resilience on a larger scale. The third phase focusses on the city's involvement with the Rockefeller 100 Resilient Cities programme as well as the notion of resilience beyond climate threats to address other issues Boston faces such as systematic racism. This phase continues the focus on citizen engagement and inclusion and also beings to focus more on embedding resilience practises into mainstream planning activities in the city. Boston has undeniably, comprehensively planned for resilience, in response to climate change threats and beyond. Along the resilience journey challenges have been encountered and long-term successes remain to be seen.

Looking to the Future

The abundance of stakeholders involved in Boston's resilience journey creates a quagmire of priorities and interests. Whilst Anchorage struggles for large-scale municipal involvement, Boston faces a range of overlapping stakeholders with varying agendas. It was stated that in Boston, there is no "*one house*" for resilience, "*which presents difficulties as there are a lot of organisations as well as municipalities within the greater Boston area, and it is challenging trying to bring them together*" (Interview with Boston Harbor Now consultant). A non-profit consultant interviewed stated that: "*resilience needs to be institutionalised*" and that "*top leaders need to understand the climatic and scientific details and the consequences*". This hint towards mainstreaming resilience within Boston reflects the wider challenges of mainstreaming, such as the sharing of specialist, scientific knowledge that is often siloed. The strong mayoral presence in the city could stand to unite the varying stakeholders jostling for priority in the arena of climate action and resilience planning Boston. Indeed, this could aid mainstreaming resilience. A

CRB representative noted that "*City Hall has generally been responsive*" to resilience and speculated that siloed working across City of Boston departments could be due to a lack of resources; "*if departments are less enthusiastic it is generally related to funding, or lack thereof.*" The interviewee suggested that overcoming siloed working "*is about changing habits and developing relationships with people and departments, as well as encouraging transparency*". Nonetheless, in the same vein as Anchorage, administrational change still stands to threaten the solidity of Boston's resilience efforts; the CRB interviewee stated that the City of Boston under the Walsh administration is working to "*ensure that resilience infiltrates all layers of city administration and beyond, so it is not simply a political thing but becomes a new 'identity' for the city and also the public are fully on board so that if leadership changes, they can press the issue and demand accountability.*" It was also recognised that the Massachusetts Mayors' Association and the Coalition of Mayors in Greater Boston help in strengthening the leadership position. Furthermore, in November 2020, Mayor Walsh was appointed Chair of Climate Mayors in the US, adding to his position as a strong leader on climate change.

Going forward, a non-profit representative interviewed was sceptical about how successfully resilience mainstreaming could occur beyond Boston, suggesting that climate issues are too specific to certain locales. Nonetheless, they identified the Reli and LEED (Leadership in Energy and Environmental Design) programmes as helping to standardise future building and development to ensure resilience. For Boston, the interviewee suggested that embedding resilience into everyday planning practice is likely to be achieved primarily through education, to help deconstruct the "*jargon*" and "*misunderstanding*" that surrounds the "*language of resilience*". Furthermore, it was suggested that in the future, climate action and resilience planning in Boston must be carried out at a more granular level with a focus on parks and neighbourhoods. In an interview with a Sustainability Officer at MIT, an additional challenge ingraining a cohesive approach to resilience in Boston was identified. "*Aligning the temporal horizon of someone's risk profile*" creates issues; managing different stakeholders to align their priorities across different time scales is a crucial element of mainstreaming resilience that centres on siloed working and stakeholder communication, a recurring issue across the climate action and resilience planning journey for cities. A representative of the Climate Ready Boston

programme concluded that, whilst significant efforts have been enacted to pursue climate action and achieve resilience in Boston, "*it is still a new concept, for the whole world, there is little guidance available and the city is still learning*". The City of Boston continues to look to the future to address upcoming challenges, in a speech in 2018. Mayor Walsh stated; "we're planning for storms the next generation will face. This is a moment they'll look back on and judge us" (Boston Globe, 2018).

Chapter 7
Case Study Comparison & Discussion

Introduction

Over the two case study chapters, the resilience planning approaches, and challenges of Anchorage and Boston have been explored, with in-depth investigations into specific resilience plans and the presentation the narrative of the role planning plays within the wider resilience approach of both cities. Between the two case studies, some stark differences as well as some overlaps stand out, and will be discussed in this chapter. Siloed working conditions, the importance of strong leadership and a committed Mayor, the requirement of knowledge and education and an inclusion of equity and factors beyond resilience transcend the individual agendas of Boston and Anchorage, regardless of the extreme or extreme-ing nature of the locations.

As well as comparing and discussing the outcomes of the case studies, the discussion will also incorporate the broader, worldwide urban climate resilience agenda, to ensure that the case studies are reflective of global issues and trends. More specifically, the themes that have come to the forefront of this thesis from the case study cities are indicative of broader, global issues that planners face across the world. Chapter 12 of the IPCC's 2014 agendas report '*Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, entitled '*Human Settlements, Infrastructure, and Spatial Planning'* covers themes including gaps in knowledge and data, the need for effective and cooperative urban leadership, political and institutional capacity, and the requirement for cities to take the lead and become empowered in the effort to address climate change (IPCC, 2014). In broad terms, the challenges faced by Anchorage and Boston do not differ much from those presented in the above report, highlighting the global proliferation of shared experience for planners. Nonetheless, the report also notes that a 'one-size-fits-all' approach to climate change planning and resilience is not to be relied upon, noting the importance of context.

For Anchorage and Boston, sitting on opposite coasts of the USA, whilst both pursuing climate resilience, and acting as urban epicentres of their surrounding regions, as seen during the individual analyses, both cities have many differences. Boston is arguably at a more advanced stage in its resilience endeavours than Anchorage, however the comparison is in no way simple. For Anchorage, the remoteness of the city, particularly with regards to the contiguous USA must be acknowledged, alongside other factors that may hinder the city's ability to pursue and achieve comprehensive resilience and climate action planning. In comparison to Boston, Anchorage is smaller, less wealthy and lacks an urban network and neighbouring cities; furthermore, its economy has fewer diversification options and is highly reliant on the production of fossil fuels. On the other hand, Anchorage is comparatively less immediately 'at-risk' than Boston, though it has its share of challenges which remain. This reflects the range of plans produced by each city; Anchorage has only one dedicated climate change related plan, whilst Boston has a multiplicity. This can also be linked to Anchorage's struggles to gain the support of stakeholders at the municipal and state levels; a stark contrast to Boston's struggles to balance the inundation of stakeholders and has the support of the State and region. Both cities however have had to contend with federal inaction and an overarching rhetoric of climate change denial and dismissal at the highest level of government. These overlaps and differences will be explored in the following chapter, drawing from the empirical data and phaseologies presented independently in the prior case study chapters.

Overlapping Narratives and Differences

Both analyses illuminated a range of overlapping narratives and commonalties shared by Anchorage and Boston along the resilience planning journey, as well as clear differences the two cities possess. Narratives and themes emerged from the analysis, guided by the initial research question themes. The key areas of interest and comparison are presented in this chapter.

The resilience and climate related plans produced by Anchorage and Boston that have been analysed throughout this project have allowed an outline of the journeys both cities have been on in pursuit of merging planning and resilience in the face of climate change, as seen in the phaseologies. For Anchorage, their journey to addressing climate change in the 21st Century began with a focus on managing geohazards and protecting the environment, whilst also prioritising urban growth and development. From here, there began a shift towards the notion of 'management' of land use and the coastline, as the focus on growth, both urban and economic, continues. Later, resilience emerges alongside adaptation, before the inclusion of collaboration and preparedness, finally leading to the attempted mainstreaming of resilience and climate action. For Boston, the focus started with mitigation and emission reduction in the city, before broadening the outlook to include long-range planning. Resilience then emerges, from there, preparedness becomes a priority. There is then a shift beyond the physical aspect of resilience to incorporate accountability, vulnerability and community, alongside mainstreaming efforts.

To situate Anchorage and Boston in a wider comparison context, we can look to cities that have followed a similar trajectory. For Boston, there is a clear similarity with its east coast neighbour, New York City. New York is recognised as a world leader in resilience planning and shares many similarities with Boston, such as a major resilience plan, in this case *OneNYC*. New York also has a panel of experts providing data and academic support to the planning efforts, as well as a range of neighbourhood level plans akin to Boston. It could be argued that New York is ahead of Boston in its resilience progress, but this could perhaps hint at Boston's future. The city may follow suit with proposing a large-scale infrastructure project like New York's 'Big U', although following the fallout of the 'Big Dig' in Boston, future flagship projects may not be so popular with the residents of the city, as this style of project is seen as a top-down imposition, often carried out without sufficient community engagement. This is somewhat reflective of the 'prestige urbanism' approaches seen in earlier extreme planning approaches in Chapter 2.

It is more difficult to draw parallels with Anchorage. In stakeholder interviews it was noted that the city found inspiration from Portland and Denver. These cities are

situated in more liberal, less extreme states than Alaska; Portland has the support of the 2013 *Oregon Resilience Pla*n and Denver partook in the Rockefeller 100 Resilient Cities programme. It may be better to compare Anchorage to similar sub-Arctic cities that are equally remote and experience similar climatic conditions. Whitehorse in Canada is a small northern city that has been pursuing some form of sustainability or resilience since 2007, with an increasing planning focus on community and climate change, although the city is supported by the Government of Yukon. The resilience trajectory of the city of St. John's in Canada's Newfoundland perhaps mirrors Anchorage's journey the closest. In 2019 the city recognised it was facing a climate emergency and thus begun a journey to creating a plan in response. Like Anchorage, the priorities cover protecting natural resources, inclusivity of the indigenous population, overall resiliency and economic and urban growth and development.

Whilst similarities are able to be drawn, it can once again be reinforced that context is crucial in terms of planning for resilience. Adding the perspectives of extreme and extreme-ing characteristics, with a particular focus on urban planning has highlighted a range of themes and challenges that are discussed below. Whilst they are applicable to some extent globally, many remain unique to the comparative case studies of Boston and Anchorage.

Breaking Down Siloed Working

Siloed working occurs at some scale in most working environments. Therrien et al. (2020) note that in municipal settings where greater resiliency is sought, the core principles of public administration are often tangled with siloed practices. It is unsurprising therefore that departmental siloes have frequently emerged as an issue within the governance of resilience agendas in cities (Wamsler et al. 2020). Moreover, siloed working within the resilience agenda often influences or links to the other key municipal practices. Notably, it was identified in Chapter 3 that planners are now increasingly having to engage and navigate urban power dynamics, as resilience extends beyond the physical notion of the city to challenge communication and decision making between different, often disconnected

stakeholders. The 2014 IPCC report further noted that, "a characteristic of effective spatial planning is interlinked and coordinated efforts that are synergistic, and the sum of which are greater than each individual part." (p.966). The siloed working experiences of both Anchorage and Boston explored in this thesis highlight how their planning systems are operating at less than effective rates, for differing reasons.

Finding a 'home' for resilience created challenges for both cities, and communication issues emerged in both cities. Cities must be able to operate at reduced capacity and capability, which means communication and responses when climate challenges and emergencies occur must be strengthened (Zhang & Li, 2018). In earlier literature review chapters, siloes were linked to the fragmentation of planning across different departments or jurisdictions, or more broadly, the blurring of responsibility and accountability planners have within the resilience process. For Bostonian stakeholders, confusion over the specific roles of different stakeholders was exacerbated by the uncommon position and power of the BPDA as its own entity. This contributed to the vagueness posited by a number of interviewees who suggested that the sharing of responsibilities and decision making throughout urban government departments and other relevant stakeholders could be uneven and ambiguous, due to the lack of resilience ownership and uncertainty regarding different departmental responsibilities.

Accountability across the resilience planning spectrum in Boston suffered from the siloed conditions as roles and priorities are not always specifically clarified. Furthermore, the addition of influential NGO's with their own agendas serves to muddy the waters more and create another aspect of disconnect. Here, the interaction between invested stakeholders can impede resilience progress and may result in an imbalanced outcome where, in this case, some systems or organisations see improved resilience whilst others lose resilience, leading to scholars questioning if resilience is a 'zero-sum game', or if fairer improvements can be made to ensure even communication across stakeholders (Shamsuddin, 2020). Whilst the notion of separate stakeholders prioritising their own needs and requirements is a venial act, it is also a major roadblock in the synergistic approach to resilience required.

Shamsuddin also introduces the idea of 'resilience resistance', where actors in cities working toward resilience can experience fatigue, complacency or overconfidence along the resilience journey (2020). For Boston, whilst siloed working has caused complications, the wealth of committed stakeholders and resilience documents produced has shown that the city has found success in its pursuit of resilience, and perhaps should be cautious of becoming complacent it its approach, or indeed overconfident.

On the other hand, Anchorage lacks the influx of invested stakeholders that challenges its counterpart, instead, fatigue may set in for stakeholders in Anchorage as they face a battle to pursue resilience against a backdrop of denial and opposition, creating communication challenges. For Anchorage, siloed working emerges in the form of disinterest and disengagement, particularly focussing on the municipal planning department. The lack of comprehensive involvement from crucial players like planners alongside the overarching laissez-faire attitude at the state and federal level in response to climate change has meant that the stakeholders working towards resilience planning in Anchorage are having to operate in relative isolation, without a wider network of support and sometimes lacking subject-specific expertise. This is almost the opposite problem to Boston where managing stakeholder involvement is more of a challenge than attracting them. Boston also has the addition of previously being part of the Rockefeller 100 Resilient Cities initiative, which, whilst providing a peer-to-peer network of cities, added extra influences, actors and stakeholders to the mix.

Beyond the case study cities, other cities have found ways to address the issues of silos. In Melbourne, Australia, siloed working conditions are said to be overcome through novel urban governance and the 100 Resilient Cities programme 'Resilient Melbourne', which Fastenrath et al. suggest acts as a "facilitator, moderator and platform for knowledge exchange" (2020, p.7), this provides an opportunity for new collaborations to be created. The authors suggest resilience incorporation in urban policy is a kind of 'urban experiment', requiring enhanced cooperation and self-reflection to overcome sectoral isolation and transform urban, and in particular, planning policy to cross more boundaries. Here, the example of an institutional

contribution to bringing stakeholders together serves to elucidate how gaps can be bridged. However, as seen in Boston, the Rockefeller programme can also add to the quagmire of stakeholders and contribute additional priorities creating new communication barriers. Whilst the example of Melbourne is used, however siloed working and the attempts to overcome it are perennial issues.

Overcoming working silos to foster meaningful collaborations across cities in the face of climate change, as evidenced in Boston and Anchorage is a challenge that cannot be fixed quickly and requires ongoing commitment to establish collaborative working as a new normal, meaning stakeholders may have to compromise on their own priorities for the greater benefit of the objective. A cohesive approach to resilience, spearheaded by a capable and proactive leadership and governance system incorporates the themes of this discussion, showing their connectedness; communication, leadership, justice, elucidate the symbiotic relationship needed for resilience to thrive in connected urban spaces.

In Anchorage, the city may be in a weaker position due to its isolation as an extreme city and lack of wider metropolitan area or neighbouring cities. Boston's network of neighbours provides support and opportunities for collaboration and strengthening that Anchorage lacks. Though, as the mainstreaming of resilience in urban planning advances, inter-city inspiration and city networks take shape. Resilience plans across sectors, governance levels and geographic spaces are studied and shared, providing communication opportunities beyond immediate geographical limitations (Wardekker et al. 2020).

At the more local level, for communication networks to flourish and for the overcoming of silos to be sustained, a strong local governance system headed by a capable leader would help immensely to manage the priorities of varying citizens and stakeholders to ensure that climate action and resilience agendas are incorporated into and alongside urban policies in a fair and just way. Anchorage and Boston both have (had) 'pro-resilience' Mayors working in the current federal 'anti-climate change' climate, each city facing different leadership and governance challenges.

Lesson: Long-term, committed, and collaborative efforts are required to overcome siloed working patters within the urban resilience agenda

This theme has endured throughout the project as a major roadblock along the resilience process and percolates through each of the other themes below, showing that there is no 'one house' for resilience within cities. The lesson learned is that without a cohesive, cross-departmental, inclusive approach, a comprehensive and sustainable planning approach cannot occur. Too much divisiveness within the urban sector, especially when budgets and expertise are totally separate, results in overlooked opportunities and a uni-sectoral working pattern (IPCC, 2014). Linking to the knowledge and education theme below, knowledge sharing, and collaboration are crucial factors to ensure that priorities are balanced and in-line, and more vulnerable, less-powerful stakeholders are not overshadowed, linking to the equity and justice theme. Nonetheless, this somewhat utopian co-existence between all stakeholders cannot be achieved overnight and requires long-term efforts to manage departmental and stakeholder institutional divisions and strengthen the overall institutional capacity within urban systems beyond just planning.

The Need for Effective Leadership & Power Sharing

In the literature review, it was highlighted that urban government systems are in a prime position to lead resilience efforts; Pike et al. suggest that in order to deliver resilience focused planning initiatives, "intelligent institutional leadership" is required to support planners in responding to change (2010, p.68). This ties in to the discussion about siloed working above on a city-wide scale; if urban systems are fragmented, a coherent and coordinated leadership will be harder to achieve (Meriläinen, 2020). Throughout the thesis, the exploration into the role of planners within urban systems has elucidated that disasters, extreme events and extreme-ing situations can catalyse political change, whilst also exposing governmental downfalls and failings. Good leadership, can foster inclusivity, promote appropriate action and protect the most vulnerable. Perhaps though, this outlook is too positive in its assumption that resilience will benefit everyone equally (Leitner et al. 2018).

Whilst evidenced by Anchorage and Boston that strong leadership and a committed urban governance system is key, the ramifications when these qualities are lacking in a city's resilience approach are many. Wakefield notes, when discussing the city of Miami, Florida, that urban resilience initiatives are a form of governance in themselves (2019). The city serves as a good example of the nebulous complexities of power, leadership and governance that enshroud urban resilience agendas and implementation in cities. Despite being one of the most at-risk cities in the US climatically, the city has faced many governance roadblocks on its path to implementing resilience. The unwaning federal, and in Miami's case, like Anchorage, state-level omission of climate change as a legitimate threat, alongside budget cuts have all impeded resilience efforts. Miami followed a segregated development trajectory where minorities were suppressed and excluded from positions of power (Coaffee & Lee, 2016; Hower, 2015). The emergence of resilience has led to this exclusionary from of governance to be challenged. This brings up a wider question of how urban resilience priorities interact with other local urban policy objectives in varying context specific settings; challenging if trajectories can intertwine, particularly in the face of parsimony are varying governance levels. Resilience in Miami has challenged leaders to reflect on established practices, but the city has to balance climate change alongside governance, the economy and real estate (Grove et al. 2020; Wakefield, 2019). This is something both Anchorage and Boston have faced in their own ways.

Both case study cities have benefitted from mayors who have publicly committed to addressing climate change and are positive figures supporting the resilience agendas in Anchorage and Boston. Thus, the theme of leadership emerged from the analysis as a crucial aspect of successfully working towards resilience and climate action; particularly in the face of federal disinterest. Both cities have accepted the responsibility at the urban level, and for both, this is a precarious position. For Boston, both the current Mayor Walsh and the former Mayor included climate action within their remit, putting the city at the forefront of climate action in the USA. Anchorage also demonstrates the influence a committed mayor can have; former Mayor Berkowitz pushed the resilience agenda based upon a personal passion for addressing climate change. Despite this, the political climate in Alaska puts the

resilience efforts at greater risk in the face of administrational change as a more traditionally Republican state as opposed to Massachusetts' stronger Democrat stance. Both cities' focus on climate action and resilience at a more granular level means that the need for strong and cooperative communities and city/regional networks increases in importance, in light of 'abandonment' at the highest level. According to Carter et al. "It is important…to remain focused on building the capacity of the planning profession to support their role in delivering positive urban outcomes." (2015, p. 51). This is not fully achievable however unless the governance systems and leadership help to facilitate these actions to support planning capacity building for resilience.

With the current federal situation overlooking climate change, it's clear the leaders of Anchorage and Boston are working to address this in their own urban contexts. The recent *2020 Draft Policy Guide* published by the APA addresses the issue of federal disinterest broadly and states that without comprehensive backing from the federal government, the pace at which planners can address climate change will be slow. A number of overarching policies are presented and the number one Federal and State Policy is: "A.1. Advocate for strong national climate leadership" (2020, p.3), followed by "A.4. Advocate for state climate change plans, policies, programs and projects" (2020, p.5). Whilst this acknowledgement is good, it still leaves a large amount of pressure on planners and other urban stakeholders to pick up the federal government's slack. In comparison to the APA's approach, we can turn to the UK to see how a more cohesive and centralised national planning system takes steps to address climate change. In the UK, the National Planning Policy Framework (NPPF) expects that planners will take climate change into greater consideration by ensuring that addressing the impacts of climate change underpins the plan and decision-making processes. The national approach the UK takes to oversee planning means that all local plan making activities are centrally linked whilst being locally focussed, including when addressing climate change. The 2008 Climate Change Act established a statutory duty for the UK government to regularly assess the predicted impacts of climate change, along with setting out proposals and policies to achieve climate change adaptation objectives. From this, planners can contribute to the objectives of the Climate Change Act, following guidelines presented in the

government's Strategic environmental assessment and sustainability appraisal, that can be used to make local plans that incorporate climate change action.

In comparison, the US approach is much less cohesive and varies state-by-state, meaning at least 50 different approaches to urban planning could be occurring at once; the power that cities have to control their own planning is also more independent. Whilst there have been examples of federal-level urban policies in the USA, it is hard to track down federal-level urban planning policies, particularly those relating to climate change, as shown in the UK. This has been more recently exacerbated by the withdrawal of the USA from the 2015 Paris Agreement and the general sentiment that the federal government has turned its back on addressing climate change. However, following the result of the November 2020 US presidential election, (as of December 2020), Joe Biden is President-Elect and has pledged that the USA will re-join the Paris Agreement and has set out 'The Biden plan for a clean energy revolution and environmental justice'. In addition, Ex-US Secretary of State John Kerry, who was instrumental in the production of the Paris Agreement has been appointed as climate envoy. The President-Elect states on his campaign website that "cities deserve to once again have a partner in the White House. Biden will be that partner" (2020), which hopefully means that planners will see new levels of support for climate change and resilience, especially at the urban level.

The issue of climate change denial and the challenge of overcoming knowledge gaps and a lack of education, whether intentional or not, is a responsibility of urban governments, such as how they utilise resources such as academic institutions. Changing stubborn opinions, particularly under the umbrella of disinterested federal leadership is an ingrained challenge that may go beyond the remit of leaders and instead become the responsibility of actors and stakeholders to educate themselves. Even after Trump's defeat in the 2020 presidential election, the entrenched anti-climate change beliefs held by him and many of his supporters will continue to exist and inhibit progress despite the change in government.

Lesson: Strong and effective leadership of cities and planning is required for effective climate action and a collective approach to urban resilience

To achieve a cohesive, silo-less, a committed leadership system is needed to provide a solid foundation to break down silos and bring stakeholders together. Here, the lesson is that leaders and urban governance must embrace their new responsibilities (in the face of the federal disengagement), when they can no longer rely on support at the national level; easier said than done especially considering the prevalence of siloed working that has been extensively discussed. The importance of cities and urban hubs has been evident throughout history and remains crucial in the current climate. Achieving this is also reliant on the power that planners themselves possess, which varies by city, state and country. Another lesson focusses more on ensuring power is not only shared, but responsibilities and accountabilities are clearly determined by urban leaders, to ensure planners and other stakeholders are aware of what is required of them, and the particular powers they can yield.

The concentrated vulnerabilities of cities have also become undeniably apparent in the wake of the Covid-19 pandemic, which has provided a lesson in the precarity of urban areas and their populations; reinforcing the need for a cohesive and resilient urban governance system that is able to rapidly make important decisions, again sometimes in absence of reasonable national support.

<u>Plugging Knowledge and Data Gaps</u>

As highlighted in the literature review, the gap between climate science and planning has yet to be significantly bridged. A broad range of data are required, as well as diverse forms of knowledge, to comprehensively plan for resilience. This links to issues of siloed working, where working in isolation is ineffectual, but getting stakeholders from different disciplines to work together and share knowledge has proved tricky (Meerow & Newell, 2016). Knowledge is a wide-encompassing concept in terms of urban resilience, incorporating (access to) education, communication regarding risk and vulnerability, data collection, management and sharing, and specific training (Wardekker et al. 2020). When used properly, in the

varying above formats, the notion of 'knowledge', along with the ability to learn dynamically, allows a city and its stakeholders to be better equipped to adapt to changes and disturbances, whilst avoiding repeating mistakes. Furthermore, local knowledge and an awareness of vulnerabilities and resources allows for an optimisation of climate action and resilience initiatives, tailored to a specific physical context and social locale (Kransy and Tidball, 2009; Nasiri et al. 2020). In Anchorage and Boston, knowledge, in its different forms, is prioritised differently, and sometimes underused, despite the power it can wield.

Interviewees in Anchorage and Boston both recognised the importance of knowledge and data within planning for climate action and resilience. For stakeholders in Anchorage, the unavailability of a range of tangible data has hindered the planning process; neither the municipality nor the University of Alaska have the resources to produce their own climatic data, nor carry out ongoing monitoring and updating. Furthermore, the siloed nature of resilience planning in Anchorage, and the undercurrent of climate change denial that particularly permeates the planning department serves to further impede the sharing of useful data, as it may be overlooked, undervalued or potentially intentionally withheld. These can all hinder the ability to project and plan accurately for future conditions. Borie et al. suggest that, in the realm of urban planning for resilience and climate action, those who produce and possess relevant knowledge dominate the policy narrative, and in some contexts, can use data and knowledge to manipulate outcomes or prioritise certain agendas (2019). For Anchorage, the lack, or minimal amount of data surrounding climate change is potentially being used as an excuse for the planners to not comprehensively commit time and resources to addressing the issue; the 'head-in-the-sand' approach that many municipal planners in Anchorage have taken to acknowledging climate change means that the base knowledge of how to produce and enact a plan is missing from the planning process in the city. As well in Anchorage, although a number of plans and documents acknowledge the importance of local, indigenous knowledge, it doesn't appear to be grounded in much action or reality.

In Boston, the participation in the Rockefeller 100 Resilient Cities programme encouraged data sharing as part of the institutional fabric of the organisation and its participants, allowing for a robust and official form of data sharing to occur.

Kransy and Tidball argue that the inclusion of a wide range of stakeholders, especially those with local knowledge, leads to a decision making system that is more supportive and better informed; "Thus, diverse forms of knowledge, including traditional ecological and scientific knowledge, may be critical in managing social-ecological systems" (2009, p.6). Nonetheless in Anchorage, a lack of knowledge, whether it be specific climatic data or how to produce a plan, seems to be an enduring obstruction in the resilience planning process for the city.

Boston on the other hand is heavily reliant on the Boston Research Advisory Group (BRAG) which comprise an academic partnership with the city and provide research and data to a range of relevant stakeholders. The proliferation of higher education establishments in Boston, alongside more financial resources and generally a more widespread commitment to addressing climate change means that stakeholders in Anchorage are at a disadvantage regarding data and knowledge gaps. Here, it could be argued that Boston possesses a stronger 'knowledge infrastructure' than Anchorage. Within these infrastructures however, the actors and stakeholders who possess the most legitimate knowledge, dictate where the decision-making power lies in cities, and can be influenced at different levels, and used to mobilise change or hinder progress (Borie et al. 2019). This is evident again when considering the mounting economic and political stakes discussed in the literature review, that have led to the current federal disinterest that permeates climate action and resilience planning across the USA, where funding for climate change research is being cut and efforts deprioritised, as misinformation and outright denial remain rife. Again, this links to the pressure that is put upon urban areas and city leaders to educate themselves and their citizens in order to act on climate change. Education at all levels of the resilience process is crucial, from local citizens understanding the risks they face, to planners and decision makers implementing the most suitable solutions.

In the literature review, it was noted that there is a lack of science-based transferable knowledge available at the city scale for planners and other stakeholders; "The world needs the same science-based foundation for cities that the Intergovernmental Panel on Climate Change provides for nations" (Rosenzweig et al. 2010, p.910). Knowledge sharing is key and there are certain international programmes such as the UNISDR Education and Training Institute for Urban Risk Reduction, or the Asia Regional Task Force on Urban Risk Reduction, aim to educate planners and create networks and knowledge sharing platforms, building the institutional capacity to incorporate resilience into planning practice. Nonetheless, these organisations are not as conspicuous and lack the global reach of organisations such as the IPCC. Overall, notions of knowledge sharing link to the urban networks discussed, where Boston benefits and Anchorage suffers from its isolation, however both cities are at the severe disadvantage of operating under a disengaged federal government.

For cities across the US and the world the many challenges of managing the multifaceted threats of climate change, alongside building resilience, managing stakeholders, knowledge production and sharing as well as a plethora of non-climate related issues may be too dynamic and complex for urban government systems to cope with; highlighting the growing need for resilience and climate action to be mainstreamed globally, and knowledge sharing systems to become active and established (Miller et al. 2018). Combined with the incorporation of context-specific local knowledge, resilience and climate action planning based on informed and equitable knowledge and decision making can potentially progress in a more informed and efficient manner.

Lesson: Work to ensure knowledge and data are available to, and understood, by all urban stakeholders, to create robust knowledge infrastructures in cities

Insights gleaned from Anchorage and Boston show how important the availability and equal distribution of freely available data for all stakeholders is within planning for resilience, whether it is quantitative data on climate change or qualitative data in the form of citizen opinions, or other data. Easy access to data is a crucial form of knowledge sharing that can be a key conduit to successfully integrating data use into

all facets of resilience planning. Nonetheless, a range of obstacles inhibit the ease at which this occurs. Recently, the rise of 'fake news' recently, has highlighted the urgent need for planners, urban leaders and stakeholders alike to be informed and educated, alongside ensuring that knowledge is shared within and between cities. The age of misinformation muddies the waters of many urban issues thus it is more important than ever, however again the issue of silos rears again, this time in the guise of knowledge sharing. A lesson here is that a more synergetic approach to problem solving and decision making is required; one where all stakeholders including planners are more aware of the responsibilities and expertise of others. This is difficult and made harder by the increased pressure being put upon cities, meaning that planners and other stakeholders are struggling to keep on top of their own work, let alone start learning about other stakeholder's jobs.

At this stage, it may be enough to simply recognise the need for increased knowledge sharing within and between cities, indeed it is being evidenced by programmes such as Rockefeller 100 Resilient Cities. The 2019 UNDRR report, *Making Cities Sustainable and Resilient: Lessons learned from the Disaster Resilience Scorecard assessment and Disaster Risk Reduction action planning* identifies that we must "recognise the value of participatory peer-to-peer reviews and lesson sharing as powerful approaches to learning", alongside noting that "Partnerships, learning and sharing are highly important for establishing networks and platforms that create spaces for discussion and action planning". (UNDRR, 2019, p.3). The report also notes that lesson sharing, and learning are dynamic and ongoing processes that must evolve alongside the city.

In the future, addressing the need for increased knowledge sharing and the utilisation of climate change data within planning may come in the form of increased training for established planners and a more committed focus on climate change issues during formal planning education at university level. Again, it must be acknowledged that this will be highly reliant on the availability of resources and will be influenced by the local context, meaning not all education can be universal in its application. Kim et al. note that whilst high-resolution climate change data should be mandated within planning practice and climate action plan-making; within regions

and even cities, there can be significant climatic variations that mean tailored plans, education and training are required to address these differences at a detailed level (2020).

Overall, one can learn that it is important that all stakeholders within the urban resilience arena are equipped with academically and scientifically rigorous knowledge, as well as local and traditional knowledge to address the more 'human' side of resilience. Beyond this it is equally important for that knowledge to be utilised in the correct manner, lest it be interpreted or employed in an incorrect way that may hinder planning progress. As mentioned, the resources and time required for suitable training and knowledge sharing to take place may slow progress, but it is crucial to highlight the importance of this. Finally, a lesson learned, particularly during the Covid pandemic of 2020, is that getting people to take scientific knowledge seriously is tricky in itself, before one can even contemplate its dissemination and application.

Beyond Climatic Resilience

Whilst the notion of justice and equality was only touched on in the literature review, and is relatively new within resilience research, it has materialised throughout this thesis in different ways in Boston and Anchorage, and other examples. The example of New Orleans was used in the literature review and highlighted how injustices within a city can exacerbate the impacts of climate change and the subsequent responses. The resilience strategy for New Orleans, released in 2015 ten years after Hurricane Katrina notes that "real estate policies reinforced racial segregation and historic settlement patterns tied to people color and lower-income residents" (City of New Orleans, 2015, p.41), this contextualises the disproportionate vulnerabilities to extreme events that are impacted by past injustices and racial inequality, an unequal distribution of wealth and limited access to social mobility. Boston has had a similar experience to New Orleans in terms of its history of racial tensions, for Anchorage the equity lens focusses more on the inclusion of the indigenous population in its planning process, which its more akin to its Arctic counterparts mentioned in the literature review.

van den Burg & Keenan noted of Boston's involvement with the Rockefeller 100 Resilient Cities programme that "Boston's' ambition for resilience and adaptation planning was unique from other American cities in that it sought to incorporate a diverse perspective on the nature of vulnerability that had not been the central focus" (2019, p.91). This focus on equity, beyond the physical, climate change aspect of resilience has a presence in the city's planning efforts, especially in the plans produced in partnership with Rockefeller, i.e. *An Equitable and Connected City*. Furthermore, in the 2017 Climate Ready Boston document, the definition of resilience incorporates equity, exemplifying the city's proposed commitment to both simultaneously, going beyond a purely physical addressment of climate change; "a truly resilient city is one that works to achieve equity: ensuring that vital services reach all residents, including the most vulnerable; providing access to opportunity for all; and actively fostering cohesive communities" (p.4). Boston's long, and ongoing, history of persistent racial division means that for the city, resilience cannot be limited to a solely climatic aspect and must incorporate the social aspects of vulnerability and inequality. In March 2020, in response to the outbreak of Coronavirus, Mayor Walsh launched the Boston Resiliency Fund to support citizens impacted by the pandemic by providing food, and technology for remote learning, as well as supporting healthcare workers in the city, showing an example of resilience beyond climate change in Boston; responding to new threats and addressing social vulnerabilities.

For Anchorage, the social aspect of resilience, beyond the purely physical approach, is presented in the form of acknowledging and treasuring 'Alaskan values' and incorporating the knowledge of indigenous residents into the planning process. Nonetheless, whilst this 'shared vision' is mentioned, tangible examples of this inclusion being implemented are not evidenced. Efforts being directed towards resilience and the production of the *Climate Action Plan* have been criticised by some for overlooking more pressing issues that the city faces, such as homelessness and crime, and there are fears that resilience planning will only benefit wealthier residents. The city is having to balance tackling climate change with inexperience,

amidst a slew of deniers alongside backlash that the resilience planning isn't going far enough to address the social aspects.

Strong leadership and urban governance systems must be married with a softer approach to resilience further than the physical, that addresses the human side of the city and the social fabric that the resilience efforts will protect, beyond the financial and real estate capital. Campanella argues that an "inclusive metropolis" can only be achieved with "strong citizen involvement at the grassroots level" (2006, p.141). Within the ideas of justice and the social aspect of resilience, to begin to address the notion of the 'inclusive metropolis', both case study cities utilised community engagement and participation as a way of reaching out to residents and attempting an inclusive resilience planning process. As mentioned, Anchorage particularly focussed on the indigenous community however this approach has been criticized: "arguments are made for legitimacy of cultural values and enfranchisement of indigenous knowledges in diverse contexts, such as among the First Nations communities in western North America" (Turner et al. 2008, p.200). This can fall under a broader criticism that community involvement and engagement when planning for resilience, whilst important for a context-specific nuanced approach, can be marginalised, or deployed at too late a stage (Coaffee and Lee, 2016). This lends itself to the idea that community engagement can be manipulated and is largely dependent on many contexts. The diversity of residents, including their socioeconomic status, for example, will impact upon how much influence their input has; including whether it is direct or indirect, for example if someone is making decisions on their behalf (Batica and Gourbesville, 2016). Here, Anchorage could fall into the trap of utilising community engagement in the wrong manner, or for the wrong reasons.

Nonetheless Anchorage comprehensively committed to an inclusive approach when putting together the *Climate Action Plan*. Boston also uses phrases such as engagement and involvement as a segue to show inclusivity and fairness in the planning process, with specific outreach efforts such as the Greenovate initiative. Notwithstanding, though clear attempts at justice and inclusivity are being made across both cities to go beyond the physical aspects of resilience and climate change

there is still some way to go to meaningfully close the gap. To begin to address this, the bridge between resilience and justice requires new forms of collaboration between urban stakeholders to ensure a collective goal is being pursued by all:

> "Resilience, inclusiveness and equity need not be mutually exclusive endeavors. The pace and scale of global resilience efforts is significant, and all actors involved in this real-time experiment, with the right program and supports, can plan for more resilient and more equitable urban futures." (Fitzgibbons and Mitchell 2019, p.39).

This will need an in-depth answer to the 'resilience for whom?' question to ensure that the resilience and justice agendas exist symbiotically by understanding vulnerabilities, injustices and "the advantages and trade-offs of adopting policies" as well as "the disproportionate impacts of climate change and urbanization" (ibid, 4). If a genuine understanding of injustices does not percolate through resilience and climate action planning, the intertwining of resilience and justice may only represent "wishful thinking" (Meerow and Newman 2019, p.16). Community engagement, whilst often cited as the 'go-to' route for including justice in the planning process, is only meaningful if genuinely taken into account and acted upon as a way of including justice in the resilience and climate action planning process. This is also identified in the 2018 IPCC *Special Report*, in the *Summary for Urban Policy Makers*. Looking at the issue of engagement within the wider setting of the urban transition towards resilience, the IPCC said that without meaningful engagement this transition cannot happen. Specifically, the ideologies and values of citizens as individuals must be addressed as the psychological implications can sometimes be overlooked within the planning and resilience process.

Lesson: Plan beyond the physical aspect of resilience to incorporate community needs and bridge the gap between resilience and social justice

For both Anchorage and Boston, whilst progress is being made to incorporate justice and equality in their climate action and resilience planning processes, both are imperfect in their approach. Fainstein notes that "the ideal of fairness and justice

transcends particularity" (2005, p.126), meaning justice and equality in cities, and within the resilience planning process does not need to be so context specific and should permeate all parts of the process wherever it is being implemented. The *2020 APA Draft Report* mentioned prior builds on this by naming the phenomenon 'interwoven equity', used in the planning context to mean "we must continually weave equity considerations into climate adaptation and mitigation decision making and action" (p.17). As resilience within urban planning begins to become more mainstream, this is one factor that can be applied anywhere in the world.

As a lesson going forward, committed stakeholders must take steps to acknowledge that incorporating justice into resilience and climate action should go beyond the surface to ensure that meaningful action is being taken to address and protect the most vulnerable in cities. The issue of justice and equality in cities goes way beyond resilience and urban planning, and has come to the forefront, especially in the USA in 2020. The police shootings and subsequent Black Lives Matter protests across America and the world during 2020 serve to reinforce the rife inequality often present in urban settings. We can learn from this that planners must do what they can to ensure equality is pushed for and prioritised to become an inherent part of the resilience planning process; it is stark that the issues go far beyond planning and resilience, but urban planning itself also has many ties to injustice and racial inequality.

Futureproofing and Mainstreaming

In the literature review, it was established that the location and physical context of a city of course impact and determine the threats that the city faces, and the same applies to the responses. Cities are increasingly looking to the future, with planners adopting more forward-thinking mindsets to ensure preparedness and a 'future-proof' approach; resilience is now a global urban concept (Coaffee, 2019). Alongside this, the concept of mainstreaming focusses not just on the future, widespread adoption, of resilience, but how well planners and other urban stakeholders can embed resilience into everyday working practices, rather than treating resilience as an appendage of the wider planning agenda. Woodruff et al.

argue that resilience solutions cannot simply be case-by-case stopgaps, but instead should be universally applicable and long-term in outlook (2018). This universality would aid in the spread of resilience initiatives in cities across the world however as evidenced in the case studies of Anchorage and Boston, issues are niche and heavily influenced by social context, financial constraints, physical geography amongst other factors. Therefore, universal solutions are unlikely to be easily come by, instead, cities must learn from each other, take inspiration from similar locations, situations or threats, and tailor the solutions to their own specific needs; leading to broad communication and local solutions to help inform the resilience mainstreaming processes within different planning departments in different cities.

The Paris Agreement of 2015, along with the SGD's and other international movements have pushed the climate action agenda to a broader, global scale. But for resilience approaches to be successfully adopted and comprehensively embedded within the urban planning level, priorities such as cohesive standards, maintained regulations, financial stability and ongoing innovation need to be considered. This need often highlights an implementation gap between theory and practice, and the requirement for resilience to become an institutionalised practice within mainstream urban governance approaches, to ensure it is included in regular policy and decision-making processes within wider urban agendas (Pitidis & Coaffee, 2020). Adding to this, Huck et al. note the requirement for a political commitment to aid the mainstreaming of resilience. This would help to anchor the concept, making it a tangible goal and allowing the required resources to be allocated, so that resilience becomes a practical and implementable objective and not just a theoretical policy narrative (2020).

Mainstreaming resilience to the point that it is an integral part of a planner's job is not a one-and-done goal, like resilience itself it is continuous and evolving process that requires an enhancement of expertise and ongoing learning; challenges that repeatedly emerge (Zuniga-Teran et al. 2020). Planners in both case study cities are looking to the future to aim to ensure that resilience and climate action planning are prioritised and normalised to fit in with day-to-day planning practice.

For Anchorage, the impacts of the *2019 Climate Action Plan* have yet to be seen in a great capacity although increased partnerships with cities in the contiguous US are being made in an effort learn and make connections. However, the resources and capacity for stakeholders to undertake ongoing monitoring are scarce and the administrational fragility threatens the concreteness of Anchorage's ongoing efforts to implement climate action and resilience solutions. Mainstreaming resilience within Anchorage's planning practice may also be overshadowed by the disconnect between municipal departments and the absence of an ingrained belief in, or perceived responsibility to address climate change, which can begin to be overcome by education and awareness. For the city, a more prolific educational approach would help smooth mainstreaming processes to ensure goals are cohesive and cooperative, and the actions towards implementation are clear (Tanner et al. 2019).

Boston has already had an established approach to addressing climate change, with resilience being a more recent facet of this. As the city continues to future-proof the city, the strong leadership and commitment means that the resilience agenda in the city is less fragile than in Anchorage, although still dependent on governmental influence. Going forward, increased education and a continued effort to overcome silos and align priorities amongst stakeholders will help to keep resilience and climate action as a crucial part of planning practice in the city. For Boston it could be that embedding resilience as a default priority would allow for a more holistic approach to resilience planning that is inclusive of social factors, combining agendas in order to achieve an equitable and inclusive planning process (Reckien et al. 2019). Mainstreaming can be horizontal in its application; joining together departments and sectors under a common goal, or vertical; percolating through governmental and power hierarchies (Coaffee et al. 2018; Tanner et al. 2019). Considering this, as discussed before, both cities suffer from the disinterest at the highest level of government, and the disjointed or disconnected manner in which different stakeholders and departments operate in the face of climate change. The options for preparedness, and a more mainstreamed, embedded and accepted approach to resilience are many and it is a still an under-researched facet of resilience, that will become more evident in future years as plans continue (or not), to be implemented.

Lesson: Focus on ingraining resilience into everyday planning practice at the city level and future-proofing the concept from governmental fluctuations

Looking to the future, Tanner et al. suggest a number of approaches to help the future-proofing and mainstreaming processes along which may benefit both Anchorage and Boston. Firstly, by identifying those with expertise and up-to-date technical knowledge, this can support and inform decision making and also develop knowledge and skills for other stakeholders. The authors also suggest decentralising the resilience process to allow for more context-specific, locally informed strategies to be developed. Institutional adaptation is also suggested; whilst the goals remain static, the route to achieve them is more flexible and reactionary, with regular monitoring and updating (2019). This is another factor requiring additional research in the future. Again, like most suggestions and observations for the improvement of the resilience and climate planning process, the requirements to secure the future of resilience as a default facet of planning are all much easier said than done, and incorporate the challenges laid out in this chapter and the thesis as a whole.

Huck et al. observed that "the aspirations that accompany the concept of urban resilience could hardly be more ambitious" (2020, p.2). A lesson learned is that mainstreaming resilience is a particularly ambitious aspiration encompassing many of the other challenges raised throughout this research, such as knowledge gaps, siloed working patters and changing the nature of urban planning. At present, resilience is still a relatively fragile prerogative within cities, at the mercy of local and national political leanings, as well as misinterpretation and misuse. As planners and other urban stakeholders work to embed resilience into existing working practices, they walk a fine line between creating a synergetic and transformed approach to futureproofing and allowing resilience to diminish as a priority as it becomes a 'norm' rather than a popular buzzword (ibid.).

Summary

Before the case study chapters, in Chapter 3, resilience was described as a 'nebulous' concept with a range of definitions, theories and interpretations. Before undertaking

the case studies, it was hoped through the comparative analysis of the resilience planning processes in Anchorage and Boston, that more clarity on the concept could be gleaned. Nonetheless, the case studies showed that the concept of urban resilience continues to be nebulous, and its interpretation and mobilisation is heavily impacted by a range of factors and challenges that contribute to its cloudy nature. By delving into the processes that both cities took in order to develop and implement climate action and resilience planning in the face of climate change, a light has been shone on how it may actually be important that the concept and definition of resilience retains an amount of flexibility in order to best serve the context in which is being applied. Too rigid a definition may lead to inappropriate or insufficient measures being used, although the flexible definitions still cause a range of challenges, as elucidated by Anchorage and Boston.

Both cities have contended with issues such as isolated working and insufficient knowledge transfer. Boston, with a plethora of stakeholders and overlapping priorities and Anchorage struggling to gain support and belief in climate change have both highlighted the need to strengthen the capacity for long-term collaboration and knowledge sharing to ease resilience implementation and mainstreaming. This is a resource reliant endeavour but is crucial in efforts such as bridging the gap between climate science and planning practice. In addition, the strong leadership exemplified in both cities is indicative of the recent federal shunning of climate change and the responsibility taken at the urban level to build resilience. The administrational change that is planned to take place in January 2021 in the USA will see Joe Biden become the US president; with a renewed federal focus on climate change this will hopefully facilitate resilience and climate action in cities across America.

Beyond a federal facilitation of urban resilience, the next step for both Boston and Anchorage is the ongoing implementation and mainstreaming of resilience within their planning practices. Making resilience itself resilient will mean that it is less at the mercy of political fluctuations as it becomes a default planning tool. This of course also requires an ongoing shift in planning practices as well as public

perceptions to ensure that the support for resilience transcends stakeholders across the urban realm.

Overall, the resilience trajectories of Anchorage and Boston have varied considerably while simultaneously being shaped and influenced by the same types of challenges. The two cities sit at different places along the wider resilience continuum. A quick Google search of 'most resilient cities in the world' sees Boston make it onto many top-10 lists. Whilst the credibility of the judging criteria could be questioned, it is clear that there is an overarching global view that Boston is on a high-profile resilience pathway. This is also evidenced by the work and specific plans produced to combat climate change and build resilience, as a result of the extreme-ing nature of the city.

Anchorage is a much newer recruit on the global quest for resilience and has only recently started a dedicated journey to resilience. The extreme nature of the city has perhaps contributed to the more tempered approach to climate change; as major climatic disruptions are still not commonplace and typical extremes are used to being handled. Nonetheless, the shift by the current leadership to build resilience shows a recognition of the threats specifically related to climate change beyond typical extremes from a dedicated group of stakeholders that notably lacks planners, against a backdrop of backlash and climate change denial.

In the following chapter, the conclusion, an overview and summary of the research is presented, before the research objectives are concretely answered. Future research opportunities are also given.

Chapter 8
Conclusion

Introduction

This final chapter concludes the thesis by giving a brief overview of the project before readdressing the research aim and questions. Then, some of the wider implications of the research are considered, before opportunities for further study are briefly discussed.

In Chapter 1, Huck et al. were quoted saying "little is known about how policymakers and planners approach the challenge of operationalising urban resilience or what problem they face" (2020, p.2). It is hoped that this thesis has contributed to rectifying this lack of knowledge. This research first sought to understand the rise of resilience as a planning concept, in response to climate change, by investigating what came before, how resilience has become a prominent planning concept and the challenges planners may encounter when building urban resilience. The empirical chapters and discussion then evidenced the complexity of the increasingly popular concept of resilience, especially when it is applied to context-specific urban areas.

The case study cities of Anchorage and Boston were used to understand both city's approaches to building (their version of) resilience and addressing climate change as a threat, seen through an urban planning lens. The planning processes, and particularly the production of climate change and resilience related plans in Anchorage and Boston were investigated in detail to elucidate the challenges planners contend with in the wider resilience agenda.

The rise of resilience and its popularity as a planning concept and a research topic provided the base rationale for conducting this research, and a starting point to develop the overarching aim and research questions. Undertaking a longitudinal study of resilience planning in specific urban contexts has meant that the questions

could be answered using 'real world' examples of planning in practice for resilience and climate action. The following section addresses the aims and research questions.

Fulfilling the Research Questions

The overarching aim and objectives of the project were set out in the introduction and have been used to shape and guide each aspect of the thesis, from the literature review to the way the analysis and discussion were approached. The overarching aim of the project has been achieved, through the document analysis, semi-structured interviews and the wider discussion. The case studies of Anchorage and Boston provided examples of extreme and extreme-ing cities, upon which knowledge could be developed to understand how the resilience planning process plays out in the two cities, providing the basis to answer the research objectives.

In this section, the questions posed at the beginning of the thesis will be answered, based on the literature review and research findings. Then, the wider implications of the research are given, followed by the limitations encountered during the research process and finishing with the suggestion of potential future research that could be linked to this project. Below is a reminder of the aim and questions:

Overarching Project Aim
To investigate and understand the role that urban planning plays within the resilience building and climate action planning process in specific city contexts.
Objectives/Research Questions
• To what extent have planners been historically involved in wider processes of mitigating and adapting to the effects of climate change in cities?
• What roles are planners taking in newer, future-looking resilience building processes?
• How do visions of, and approaches to, resilience differ between extreme and extreme-ing cities?

Table 16. *Research Aims, Objectives & Questions*

Question 1

To what extent have planners been historically involved in wider processes of mitigating and adapting to the effects of climate change in cities?

Initial approaches to mitigation and adapting to the effects of climate change were global in scale and rigid in action. Examples such as the early IPCC reports of the 1990s used scenario planning and focussed on emission reduction; ideas that are reflected in Anchorage and Boston's first efforts, where avoiding risk was the priority. At the urban level, less specific action was being taken, and planners were generally not at the forefront.

As the global sense of perpetual risk grew and the threats of climate change became more apparent, more urgency, and a more flexible and future-looking approach was required. Resilience emerged out of this, and so too did an acknowledgement that planners could play a role in addressing climate change in cities. Focussing on the two case study cities, earlier approaches to addressing climatic issues in Anchorage focussed on using land use planning as a technique to steer development away from at-risk areas of the city; more developed and committed forms of planning for climate change have yet to come to fruition in the city. For Boston, initial efforts to plan for the effects of climate change in the city were based on attempts to mitigate impacts through emissions reduction and building codes. The history of Boston's urban planning also reflects their approach to resilience planning. As the department has become more transparent and inclusive, resilience planning has evolved beyond climatic considerations. Overall, in Boston, planning for climate change has followed the global trajectory and now planners are a key part of the overall process.

Both of these earlier approaches are preventative in manner, before a later acceptance emerged to focus on remaining resilient in the face of inevitable climatic impacts that can no longer be prevented, and planners, especially in Boston, took on more proactive roles within the wider process of mitigating and adapting to the effects of climate change. In Anchorage, planning for this purpose still appears underutilised.

Question 2

What roles are planners taking in newer, future-looking resilience building processes?

It has become evident throughout the research process that the role urban planners play in the resilience process is neither definite nor consistent and is at the mercy of a multitude of factors including geographical context, urban governance systems and city resources. Anchorage and Boston have shown highly contrasting planning approaches. Both cities, however, suffer from a lack of knowledge of what planners actually do, and it was noted in a number of plans in both case studies that planners are often called upon to implement certain objectives, regardless of planning capacity.

For Anchorage, when analysing the process that led to the publication of the recent *Climate Action Plan*, as shown particularly through the focus group with the Municipality of Anchorage Planning Department, there is a disconnect between planners and the resilience building process in the city. Planners play a minimal role and at present, do little to engage with the newer, future-looking resilience agenda; this is reflected in the overwhelming state-wide attitude that climate change is not a priority in Alaska. The small window of opportunity available to work on the CAP without the involvement of planners was the result of political necessity based on the limited time the current mayor still has in office. If the resilience agenda in Anchorage withstands a change of urban administration in April 2021, there may be an opportunity for planners to contribute to resilience and climate action in the city.

In Boston, whilst the BPDA has a tumultuous history and unique position within the city, planners do play a role within the city's resilience agenda Planners are involved in the production of neighbourhood and city-level plans, making active contributions and working with other stakeholders and departments on objectives such as climate preparedness policies and waterfront development to address sea level rise. Flagship projects such as Moakley Park play an important role in Boston's resilience planning efforts. Building resilience in Boston often takes a two-pronged approach, focussing on addressing climate change and other issues such as racial inequality. The planning

efforts in Boston are supported through better access to climate data and networks such as the former Rockefeller 100 Resilient Cities Programme. Challenges for planners still exist in Boston, with issues such as siloed working and clashing stakeholder priorities.

Overall, the roles planners are taking in newer, future-looking resilience building processes are shaped by factors including the political leanings of the locale with regards to the prioritisation of climate change. More broadly, the involvement of planning in the resilience planning process can often be hindered by misconceptions regarding the abilities and job descriptions of planners. It was noted that in both cities, plans often put responsibilities upon planners, without an awareness or understanding of the capacity of planners, potentially viewing them as a panacea of sorts, or, the opposite occurred and planners were overlooked.

Question 3

How do visions of, and approaches to, resilience differ between extreme and extreme-ing cities?

The notions of 'extreme' and 'extreme-ing' added a unique lens through which to carry out the research and reinforce the importance and influence of context in the consideration of how urban planning and planning professionals fit in with the overall resilience agendas of cities in the USA and across the world.

Based on the exploration of Anchorage as an extreme city, conclusions can be drawn that potentially for cities that already have an experience of dealing with climate extremes, the additional threat of climate change is not perceived as imminent or of top importance for many stakeholders, or perhaps is less of a priority than other pressing urban issues. It could also be argued that extreme experience, whilst fostering a more innate ability to cope, can also lead to complacency. Extreme factors such as the remoteness of Anchorage, and the reliance on transport infrastructure to import resources into the city may more significantly affect the city's approach to resilience when and if these infrastructures fail, in a similar way to how a major coastal storm could be a resilience trigger in an extreme-ing city.

For those in Anchorage contributing to the resilience agenda, it is recognised that climate change is exacerbating existing extremes and there is a requirement to 'catch-up' to other cities that are further along their resilience building process.

It can be surmised that an extreme-ing city such as Boston has a higher sense of urgency to plan for resilience as it is experiencing increasingly frequent or severe climate change related shocks or stresses. The city has a much more committed and comprehensive approach to urban resilience as a result. Boston also takes resilience further, by focussing on addressing institutionalised racial inequality through their resilience strategy.

After evaluating the impact that the concepts of extreme and extreme-ing have on the resilience approaches in cities, whilst ideas about the level of commitment (in extreme cities) and rapidity of action (in extreme-ing cities) have formed, it is clear that it is not enough to consider extreme and extreme-ing on their own. As with question 2, a range of factors influence the resilience planning process in cities, beyond the extreme or extreme-ing characteristics. Nonetheless these two characteristics will often serve as an initial indicator of what type of resilience action is being taken.

Wider Implications

The Resilience of Resilience

The rise of resilience within urban planning has challenged planners and planning practice to shift their perceptions and approaches to their work. If climate change related disasters and challenges could be precisely predicted, then responses could be planned accordingly and accurately. Nonetheless, the growth in frequency and extremity of climatic challenges has changed the nature of planning to a more uncertainty-oriented approach, versus the more conventional versions of planning (Liao, 2012; Acuti & Bellucci, 2020).

Historically, before resilience became more commonplace in planning, planners looked to the past to inform future action. However, Coaffee comments that "thinking in a resilient way means the future is not an extrapolation of the past. It means we have to plan for the coming uncertainty but do so in a way that is transparently organised, fair and equitable" (2019, p.240). This requires planners and planning theory to engage in active adaptation; both responding to change and influencing the change itself (Mehmood, 2015).

Planning has become associated with neat, orderly and prescriptive urban settings, where the unplanned chaos of cities of the past is fought with to achieve structure and harmony. In reality, climate change, alongside a range of urban challenges, is a constant disruption to the desired order, repeatedly putting a metaphorical spanner in the works of the traditional axioms of planning. Instead of a cycle of reaction, the complexities and uncertainties pertaining to future crises should be worked with and incorporated into the 'new normal' as planning practice is 'reworked' going forward. Shifting towards a more collaborative, 'joined-up' and dynamic approach to planning is crucial; recognising that climate change issues transcend administrative boundaries and resilience is a never-ending dynamic process as opposed to a concrete goal.

As planning practice begins its shift towards a more flexible, future-looking version, the staying power of resilience itself must also be considered. Resilience mainstreaming is a popular research topic, but it is only with time that we will know if resilience is here to stay for good. Shamsuddin questions, "can urban resilience as applied ever live up to the concept?" (2020, p.103). Whilst resilience seems fairly resilient itself in the slew of buzzwords that get thrown at cities and climate change, one could speculate about its potential to 'fizzle out' as stakeholders lose enthusiasm and rewards are not reaped for the efforts being put in presently. As discussed before, there are a range of factors that influence the prioritisation of resilience, and only time will tell if resilience truly is resilient. Political players acting as 'agents of change' will continue to have a major impact on this, particularly in the USA regarding the election of Joe Biden in November 2020, but also across the world.

When thinking about the future of resilience, it would be remiss to not to also acknowledge the impact of Coronavirus on cities, and the implications this may have on the concept and use of resilience in the urban context, as well as the prioritisation of climate resilience.

Resilience and Covid-19

When future-proofing cities, planning for resilience in the face of climate change cannot stand alone and should be considered alongside every other challenge that cities face. Most recently, this has been the ongoing Covid-19 outbreak that has put the resilience of cities to the test as they became hotbeds of the pandemic across the globe. Whilst climate change is one of the biggest threats to human life in the 21st century, in 2020, climate change and other urban priorities have taken a backseat to far reaching impacts of coronavirus across the globe. The example of the pandemic however can be used to elucidate that the challenges of implementing resilience regardless of the reason. The effects of Coronavirus have been widespread and have gone far beyond health implications, severely effecting economies and augmenting inequality around the world as well as urban spaces.

Cities and their leaders are again on the front line of action, facing the responsibilities of responding to coronavirus whilst "wielding stifled powers, often limited data…and global connectivity challenges" (Acuto, 2020, p.318). The results of this, particularly evidenced in the US, are mixed. This again reflects the need for knowledge, data and education to ensure that responses are timely, coordinated and undertaken by the majority of people. Here, planners and other stakeholders must go beyond climatic resilience by broadening crisis planning to incorporate biological hazards into their remit (Djalante et al. 2020). Indeed, this is already becoming evident as we enter the 'new normal'; as cities and planners adapt, their responses are likely to impact cities in number of ways. Examples such as 'pop-up' cycle lanes across Scotland, to reduce the need for public transport use show a response that may also benefit the environment but impact the transport sector. The period of lockdown also highlighted urgent urban requirements such as the need to be close to accessible greenspace. It will be interesting to see how city centres transform, or if they even

survive, if homeworking and a lack of commuting becomes an ongoing and accepted way of working. Whilst it's too early to tell, pondering what form the future, post-coronavirus city will take is intriguing and will likely have knock-on impacts upon a range of urban issues, including resilience and climate change planning, as priorities shift and overlap, and new challenges arise.

Future Research Opportunities

Questions arise regarding the benefit of incorporating climate change considerations into wider planning policy, versus maintaining a more dedicated approach alongside, rather that within, other urban policy (Reckien et al. 2019). More long-term research could be carried out to investigate the success of resilience mainstreaming within urban planning policy, compared to a more isolated focus on resilience as a separate goal. Perhaps 'resilience planner' could be a specific job title in the future, depending on the trajectory of urban resilience.

Focussing on this thesis in particular, the approach of linearly researching a chosen city's resilience journey through chronologically analysing planning documents could be carried out in other cities, on a larger scale, to allow for more comparative opportunities and to potentially identify an overlap of patterns or approaches within the resilience planning process that could further contribute to knowledge sharing and be used to build networks and ideas between urban planners.

In addition, the limited timeframe within which the research took place means whilst the history and current status of resilience and climate action planning in Anchorage and Boston could be explored in depth, future updates and more long-term investigations into the ongoing outcomes and potential successes of the implementation of plans and initiatives could not be explored. Ongoing monitoring and assessment of resilience efforts in planning practice will inform on its staying power, especially in comparison to similar phrases such as sustainability. More time could extent the research into the two cities, for example to track the impact of the 2019 Anchorage CAP. This feeds into potential future research above, to understand the sustainability of resilience and offer deeper insights into different resilience

planning approaches over time in different urban contexts as well as to broaden the understanding of how resilience is entering or influencing mainstream planning practice.

In closing, this project has posed and attempted to answer questions regarding the relationship between planning, resilience and climate change in two contrasting case study cities. By delving into a future-looking world of urban unknowns, that is shaped by physical, social, economic and political contexts, it seems at least clear that the global focus remains on cities as they continue to influence and reflect how the world acts in uncertain situations.

Bibliography

Acuti, D., & Bellucci, M. (2020). Resilient cities and regions: planning, initiatives, and perspectives. *Climate Action*, 763-774.

Acuto, M. (2020). COVID-19: lessons for an urban (izing) world. *One Earth*. *2*(4), 317-319.

Ahern, J. (2013). Urban landscape sustainability and resilience: the promise and challenges of integrating ecology with urban planning and design. *Landscape ecology*, *28*(6), 1203-1212.

Akimoto, F. (2009). The birth of 'land use planning' in American urban planning. *Planning Perspectives*, *24*(4), 457-483.

Alawadi, K. (2019). A return to the old landscape? Balancing physical planning ideals and cultural constraints in Dubai's residential neighborhoods. *Journal of Housing and the Built Environment*, *34*(1), 235-263.

Alcoforado, M. J., & Matzarakis, A. (2010). Urban climate and planning in different climatic zones. *Geographicalia*, (57), 5-39.

Aldrich, D. P. (2012). *Building resilience: Social capital in post-disaster recovery*. Chicago: University of Chicago Press.

Alexander, C. (1964). A city is not a tree. *1965*, *124*. Portland: Sustasis Foundation

Alibašić, H. (2018). *Sustainability and resilience planning for local governments: The quadruple bottom line strategy*. New York: Springer.

Alofsin, A. (2002). *The struggle for modernism: Architecture, landscape architecture, and city planning at Harvard*. New York: WW Norton & Company.

Altheide, D. L. (2000). Tracking discourse and qualitative document analysis. *Poetics*, *27*(4), 287-299.

American Planning Association. (2020). Draft Policy Guide. [Online]. Available at: https://www.planning.org/publications/document/9203323/ (Accessed: 16/11/20).

Arroyo, F. M., López, H. S., & Blanco, J. L. Y. (2015). Are local action groups, under LEADER approach, a good way to support resilience in rural areas?. *Ager. Revista de Estudios sobre Despoblación y Desarrollo Rural*, (18), 39-63.

Ascott, K., & Kenny, M. J. (2019). Addressing the complexities of resilience in urban design and planning. *Town Planning Review*, *90*(5), 473-479.

Atallah, D. G. (2016). Toward a decolonial turn in resilience thinking in disasters: Example of the Mapuche from southern Chile on the frontlines and faultlines. *International Journal of Disaster Risk Reduction*, *19*, 92-100.

Atkinson, P. A. & Coffey, A. (1997). Analysing documentary realities. In: D. Silverman (Ed.), *Qualitative research: Theory, method and practice*. Thousand Oaks: Sage Publishing.

Atzori, R., & Fyall, A. (2018). Climate change denial: vulnerability and costs for Florida's coastal destinations. *Journal of Hospitality and Tourism Insights*. ault.aspx. (Accessed: 10/10/19).

Bai, X, Dawson, R., Ürge-Vorsatz, D., Delgado, G., Barau, A., Dhakal, S., Dodman, D., Leonardsen, L., Masson-Delmotte, & V., Roberts, D. (2018). Six research priorities for cities and climate change. *Nature*. *555*, 23–25.

Baklanov, A., Grimmond, C. S. B., Carlson, D., Terblanche, D., Tang, X., Bouchet, V., & Hovsepyan, A. (2018). From urban meteorology, climate and environment research to integrated city services. *Urban Climate*, *23*, 330-341.

Bannova, O. (2014). Extreme environments-design and human factors considerations. *Thesis*. Gothenburg: Chalmers University of Technology.

Barnett, J. & Lindsay, J.V. (1974). *Urban design as public policy: Practical methods for improving cities*. New York: McGraw-Hill Companies.

Batica, J., & Gourbesville, P. (2016). Resilience in flood risk management–a new communication tool. *Procedia Engineering*, *154*, 811-817.

Batty, M. (2008). The size, scale, and shape of cities. *Science*, *319*(5864), 769-771.

Batty, M., & Marshall, S. (2012). *Complexity theories of cities have come of age*. Berlin: Springer.

Beck, U. (1986). *Risk society. Essential concepts of global environmental governance*. Oxford: Routledge.

Beigi, S. (2015). The timeline of resilience: A roadmap for cross operationalization of resilience. *Ecology and Society*, *18*.

Béné, C., Chowdhury, F. S., Rashid, M., Dhali, S. A., & Jahan, F. (2017). Squaring the circle: reconciling the need for rigor with the reality on the ground in resilience impact assessment. *World Development*, *97*, 212-231.

Berkes, F. (2007). Community-based conservation in a globalized world. *Proceedings of the National academy of sciences*, *104*(39), 15188-15193.

Berkes, F., & Ross, H. (2016). Panarchy and community resilience: Sustainability science and policy implications. *Environmental Science & Policy*, *61*, 185-193.

Berry, C. (2018). Anchorage should be Alaska's capital. *The Northern Light*. [Online]. Availale at: https://www.thenorthernlight.org/anchorage-should-be-alaskas-capital/ (Accessed: 08/12/20).

Betsill, M. M., & Bulkeley, H. (2006). Cities and the multilevel governance of global climate change. *Global governance*, *12*, 141.

Biden Harris Campaign. (2020). The Biden Plan for a Clean Energy Revolution and Environmental Justice. [Online]. Available at: https://joebiden.com/climate-plan/ (Accessed: 16/11/20).

Biermann, M., Hillmer-Pegram, K., Knapp, C. N., & Hum, R. E. (2016). Approaching a critical turn? A content analysis of the politics of resilience in key bodies of resilience literature. *Resilience*, *4*(2), 59-78.

Bintanja, R., & Van der Linden, E. C. (2013). The changing seasonal climate in the Arctic. *Nature: Scientific reports*. 3(1556).

Birch, T., & Carney, J. (2019). Delta urbanism: Aligning adaptation with the protection and restoration paradigm in Coastal Louisiana. *Technology Architecture+ Design*, *3*(1), 102-114.

Borden, K. A., Schmidtlein, M. C., Emrich, C. T., Piegorsch, W. W., & Cutter, S. L. (2007). Vulnerability of US cities to environmental hazards. *Journal of Homeland Security and Emergency Management*, *4*(2).

Borie, M., Pelling, M., Ziervogel, G., & Hyams, K. (2019). Mapping narratives of urban resilience in the global south. *Global Environmental Change*, *54*, 203-213.

Bosher, L. (Ed.). (2008). *Hazards and the built environment: attaining built-in resilience*. Oxford: Routledge.

Bosher, L., & Coaffee, J. (2008). International perspectives on urban resilience. Urban Design and Planning. (2)161. 75-83.

Boston Planning & Development Agency. (2019). What is Planning?. [Online]. Available at: http://www.bostonplans.org/planning/what-is-planning. (Accessed: 06/11/19).

Boston Planning and Development Agency. (2017). Climate Resiliency Guidance. [Online]. Available at: http://www.bostonplans.org/getattachment/5d668310-ffd1-4104-98fa-eef30424a9b3. (Accessed: 01/11/19).

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*, *9*(2), 27-40.

Brody, S. D. (2003). Are we learning to make better plans? A longitudinal analysis of plan quality associated with natural hazards. *Journal of Planning Education and Research*, *23*(2), 191-201.

Brody, S. D. (2003). Are we learning to make better plans? A longitudinal analysis of plan quality associated with natural hazards. *Journal of Planning Education and Research*, *23*(2), 191-201.

Bump, P. (2018). Trump responds to his administration's report indicating a huge cost from climate change: 'I don't believe it'. *The Washington Post*. [Online]. Available at: https://www.washingtonpost.com/politics/2018/11/26/trump-responds-report-indicating-huge-cost-climate-change-i-dont-believe-it/. (Accessed 23/09/19).

Burby, R. J. (Ed.). (1998). *Cooperating with nature: confronting natural hazards with land-use planning for sustainable communities*. Washington: Joseph Henry Press.

Bush, J., & Doyon, A. (2019). Building urban resilience with nature-based solutions: How can urban planning contribute?. *Cities*, *95*, 102483.

Byrne, D. (2003). Complexity theory and planning theory: a necessary encounter. *Planning Theory*, *2*(3), 171-178.

Campanella, T. J. (2006). Urban resilience and the recovery of New Orleans. *Journal of the American planning association*, *72*(2), 141-146.

Campbell, S. (1996). Green cities, growing cities, just cities?: Urban planning and the contradictions of sustainable development. *Journal of the American Planning Association*, *62*(3), 296-312.

Carmin, J., Anguelovski, I., & Roberts, D. (2012). Urban climate adaptation in the global south: planning in an emerging policy domain. *Journal of Planning Education and Research*, *32*(1), 18-32.

Carmona, M. (2014). The place-shaping continuum: A theory of urban design process. *Journal of Urban Design*, *19*(1), 2-36.

Carter, J. G., Cavan, G., Connelly, A., Guy, S., Handley, J., & Kazmierczak, A. (2015). Climate change and the city: Building capacity for urban adaptation. *Progress in planning*, *95*, 1-66.

Center for Climate and Energy Solutions (C2ES). (2016). Key Insights on Business, State and City Collaboration for a Resilient Anchorage. [Online]. Available at: https://www.c2es.org/site/assets/uploads/2016/04/key-insights-collaboration-resilient-anchorage.pdf (Accessed: 08/12/20).

Chandler, D., & Coaffee, J. (2016). *The Routledge handbook of international resilience*. Oxford: Routledge.

Chandler, T. J. (1976). Urban climatology and its relevance to urban design. *World Meteorological Society*. *149*(74).

Choplin, A., & Franck, A. (2014). Seeing Dubai in Khartoum and Nouakchott:'gulfication' on the margins of the Arab world. *Under construction: logics of urbanism in the Gulf Region*, 271-284.

Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. *IOSR Journal of Humanities and Social Science*, *19*(4), 99-104.

City of Boston. (2007). Climate: Change - The City of Boston's Climate Action Plan. [Online]. Available at: https://www.cityofboston.gov/climate/pdfs/CAPJan08.pdf (Accessed: 23/10/20).

City of Boston. (2007). Executive Order of Mayor Thomas M. Menino – An Order Relative to Climate Action in Boston. [Online]. Available at: https://www.cityofboston.gov/images_documents/Clim_Action_Exec_Or_tcm3-3890.pdf (Accessed: 23/10/20).

City of Boston. (2010). Sparking Boston's Climate Revolution. [Online]. Available at: https://www.cityofboston.gov/Images_Documents/BCA_full_rprt_r5_tcm3-19558.pdf (Accessed: 23/10/20).

City of Boston. (2011). A Climate of Progress - City of Boston Climate Action Plan Update 2011. [Online]. Available at: https://www.cityofboston.gov/Images_Documents/A%20Climate%20of%20Progress%20-%20CAP%20Update%202011_tcm3-25020.pdf (Accessed: 23/10/20).

City of Boston. (2013). Climate Ready Boston: Municipal Vulnerability to Climate Change. [Online]. Available at: https://www.cityofboston.gov/news/uploads/30044_50_29_58.pdf (Accessed: 23/10/20).

City of Boston. (2014). Greenovate Boston - 2014 Climate Action Plan Update. [Online]. Available at: https://www.cityofboston.gov/eeos/pdfs/Greenovate%20Boston%202014%20CAP%20Update_Full.pdf (Accessed: 23/10/20).

City of Boston. (2016). Boston's Preliminary Resilience Assessment. [Online]. Available at: https://www.boston.gov/sites/default/files/embed/p/prabrochure-update_printcopy.pdf (Accessed: 23/10/20).

City of Boston. (2016). Climate Ready Boston. [Online]. Available at: https://bostoncan.files.wordpress.com/2017/01/climate-ready-boston-12-2016.pdf (Accessed: 23/10/20).

City of Boston. (2016). The Blueprint - A Preview of the Principles & Framework for Boston's Resilience Strategy. [Online]. Available at: https://content.boston.gov/sites/default/files/file/document_files/2016/11/kskd_100rc_boston_theblueprint_v4.pdf (Accessed: 23/10/20).

City of Boston. (2017) Resilient Boston – An Equitable and Connected City. [Online]. Available at: https://www.boston.gov/sites/default/files/document-file-07-2017/resilient_boston_digital.pdf (Accessed: 23/10/20).

City of Boston. (2017). Coastal Resilience Solutions for East Boston and Charlestown - Final Report. [Online]. Available at: https://www.boston.gov/sites/default/files/embed/c/climatereadyeastbostoncharlestown_executivesummary_pages.pdf (Accessed: 23/10/20).
City of Boston. (2017). Imagine Boston 2030. [Online]. Available at: https://www.boston.gov/sites/default/files/embed/i/imagine-boston-executive_summary.pdf (Accessed: 23/10/20).

City of Boston. (2018). Coastal Resilience Solutions for South Boston - Final Report. [Online]. Available at: https://www.boston.gov/sites/default/files/imce-uploads/2018-09/climatereadysouthboston_execsum_v9.1s_web.pdf (Accessed: 23/10/20).

City of Boston. (2019). Resilience and Racial Equity. [Online]. Available at: https://www.boston.gov/departments/resilience-and-racial-equity#:~:text=We%20lead%20efforts%20to%20help,persistent%20racial%20and%20economic%20inequality.&text=Our%20department%20works%20to%20to,in%20place%20Boston's%20Resilience%20Strategy (Accessed: 23/04/19)/

City of New Orleans. (2015). Resilient New Orleans: Strategic Actions to Shape Our Future City. [Online]. Available at: http://resilientnola.org/wp-content/uploads/2015/08/Resilient_New_Orleans_Strategy.pdf (Accessed: 16/11/20).

Coaffee, J. (2013). Rescaling and responsibilising the politics of urban resilience: From national security to local place-making. *Politics*, *33*(4), 240-252.

Coaffee, J. (2019). *Future Proof: How to Build Resilience in an Uncertain World*. Hartford: Yale University Press.

Coaffee, J., & Clarke, J. (2015). On securing the generational challenge of urban resilience. *Resilience*. 5(3).

Coaffee, J., de Albuquerque, J. P., & Pitidis, V. (2020). Risk and Resilience Management in Co-production. In *The Palgrave Handbook of Co-Production of Public Services and Outcomes* (pp. 541-558). London: Palgrave Macmillan.

Coaffee, J., & Fussey, P. (2015). Constructing resilience through security and surveillance: The politics, practices and tensions of security-driven resilience. *Security Dialogue*, *46*(1), 86-105.

Coaffee, J., & Lee, P. (2016). *Urban resilience: Planning for risk, crisis and uncertainty*. Macmillan International Higher Education.

Coaffee, J., Therrien, M. C., Chelleri, L., Henstra, D., Aldrich, D. P., Mitchell, C. L., & participants. (2018). Urban resilience implementation: A policy challenge and research agenda for the 21st century. *Journal of Contingencies and Crisis Management*, *26*(3), 403-410.

Connell, D. J. (2009). Planning and its orientation to the future. *International Planning Studies*, *14*(1), 85-98.

Cooke, N. J. (1994). Varieties of knowledge elicitation techniques. *International Journal of Human-Computer Studies*, *41*(6), 801-849.

Corbin, J., & Strauss, A. (2008). *Strategies for qualitative data analysis*. Thousand Oaks: Sage Publications.

Cranley, E. (2019). These are the 1030 current members of Congress who have doubted or denied climate change. *Business Insider*. [Online]. Available at: https://www.businessinsider.com/climate-change-and-republicans-congress-global-warming-2019-2?r=US&IR=T (Accessed: 13/08/20).

Crawford, R. (2016). What can complexity theory tell us about urban planning? *New Zealand Productivity Commission*. [Online]. Available at: https://www.productivity.govt.nz/assets/Documents/d58b01f117/What-can-complexity-theory-tell-us-about-urban-planning.pdf (Accessed: 07/11/20).

Dalby, S. (2013). Biopolitics and climate security in the Anthropocene. *Geoforum*, *49*, 184-192.

Dandekar, H. C. (1986). Some uses and potentials of qualitative methods in planning. *Journal of planning Education and Research*, *6*(1), 42-49.

Davies, A., Hoggart, K., Lees, L. (2002). *Researching Human Geography*. Oxford: Routledge.Davoudi, S. (2012). The legacy of positivism and the emergence of interpretive tradition in spatial planning. *Regional Studies*, *46*(4), 429-441.

Davoudi, S., & Porter, L. (2012). Applying the resilience perspective to planning: Critical thoughts from theory and practice. *Planning Theory & Practice*, *13*(2), 299-333.

Davoudi, S. (2014). Climate change, securitisation of nature, and resilient urbanism. *Environment and Planning C: Government and Policy*, *32*(2), 360-375.

Davoudi, S., & Strange, I. (2008). *Conceptions of space and place in strategic spatial planning* (Vol. 17). Oxford: Routledge.

Davoudi, S., Shaw, K., Haider, L.J., Quinlan, A.E., Peterson, G.D., Wilkinson, C., Fünfgeld, H., McEvoy, D., Porter, L. and Davoudi, S., (2012). Resilience: a bridging concept or a dead end? "Reframing" resilience: challenges for planning theory and practice interacting traps: resilience assessment of a pasture management system in Northern Afghanistan urban resilience: what does it mean in planning practice? Resilience as a useful concept for climate change adaptation? The politics of resilience for planning: a cautionary note. *Planning theory & practice*, *13*(2), pp.299-333.

de Bruijn, K., Buurman, J., Mens, M., Dahm, R., & Klijn, F. (2017). Resilience in practice: Five principles to enable societies to cope with extreme weather events. *Environmental Science & Policy*, *70*, 21-30.

Desouza, K. C., & Flanery, T. H. (2013). Designing, planning, and managing resilient cities: A conceptual framework. *Cities*, *35*, 89-99.

Dhar, T. K., & Khirfan, L. (2016). Community-based adaptation through ecological design: lessons from Negril, Jamaica. *Journal of Urban Design*, *21*(2), 234-255. dialogue-leaves-post/QxMba6mGeqqH6JcLLoe9xH/story.html. (Accessed: 01/11/19).

Dinić, M., & Mitković, P. (2011). Planning regulations in the USA and their implications on urban design in the central city zone. *Facta universitatis-series: Architecture and Civil Engineering*, *9*(2), 289-299.

Djalante, R., Shaw, R., & DeWit, A. (2020). Building resilience against biological hazards and pandemics: COVID-19 and its implications for the Sendai Framework. *Progress in Disaster Science*, 100080.

Dlugolecki, A. F. (2000). Climate change and the insurance industry. *The Geneva Papers on Risk and Insurance-Issues and Practice*, *25*(4), 582-601.

DuPuis, E. M., & Greenberg, M. (2019). The right to the resilient city: progressive politics and the green growth machine in New York City. *Journal of Environmental Studies and Sciences*, *9*(3), 352-363.

Ebrahimabadi, S. (2015). Outdoor comfort in cold climates: Integrating microclimate factors in urban design. *Thesis*. Luleå tekniska universitet.

Eliasson, I. (2000). The use of climate knowledge in urban planning. *Landscape and urban planning*, *48*(1-2), 31-44.

Engle, N. L. (2011). Adaptive capacity and its assessment. *Global environmental change*, *21*(2), 647-656.

Ernstson, H., Van der Leeuw, S. E., Redman, C. L., Meffert, D. J., Davis, G., Alfsen, C., & Elmqvist, T. (2010). Urban transitions: on urban resilience and human-dominated ecosystems. *Ambio*, *39*(8), 531-545.

Fainstein, S. S. (2005). Planning theory and the city. *Journal of planning education and research*, *25*(2), 121-130.

Fainstein, S. S. (2014). The just city. *International Journal of Urban Sciences*, *18*(1), 1-18.

Farish, M., & Lackenbauer, P. W. (2009). High modernism in the Arctic: planning Frobisher Bay and Inuvik. *Journal of Historical Geography*, *35*(3), 517-544.

Fastenrath, S., Bush, J., & Coenen, L. (2020). Scaling-up nature-based solutions. Lessons from the Living Melbourne strategy. *Geoforum*, *116*, 63-72.

Fazli, R. F., & Faridi, R. A. (2010). Green Buildings in India: A road ahead for sustainable environment. *Journal of Social Sciences, India*, 1-8.

Fein, M.R. (2011). Tunnel Vision: 'Invisible' Highways and Boston's 'Big Dig' in the Age of Privatization. *Journal of Planning History*, 11(1), pp.47-69.

Federal Emergency Management Agency. (2017) Risk Report – Municipality of Anchorage. [Online]. Available at: https://www.fema.gov/locations/alaska (Accessed: 14/11/18).

Filion, P. (2013). Fading resilience? Creative destruction, neoliberalism and mounting risks. *SAPI EN. S. Surveys and Perspectives Integrating Environment and Society*, (6.1).

FiIlippi, M.E. (2018). Planning in a complex, changing and uncertain urban reality: the emergence of a resilience planning paradigm in the city of Barcelona. DPU Working Paper No.194.

Fishman, R. (1982). *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright, and Le Corbusier*. Cambridge: MIT Press.

Fisichelli, N. A., Schuurman, G. W., & Hoffman, C. H. (2016). Is 'resilience' maladaptive? Towards an accurate lexicon for climate change adaptation. *Environmental Management*, *57*(4), 753-758.

Flick, U. (2004). Triangulation in qualitative research. *A companion to qualitative research*, *3*, 178-183.

Forester, J. (1993). *Critical theory, public policy, and planning practice*. New York: SUNY Press.

Foucault, M.(1978). The history of sexuality. New York: Pantheon Books.

Friedman, A. (2012). *Town and terraced housing: for affordability and sustainability*. London: Routledge.

Friedman, E., Breitzer, R., & Solecki, W. (2019). Communicating extreme event policy windows: Discourses on Hurricane Sandy and policy change in Boston and New York City. *Environmental Science & Policy*, *100*, 55-65.

Friedman, E., Breitzer, R., & Solecki, W. (2019). Communicating extreme event policy windows: Discourses on Hurricane Sandy and policy change in Boston and New York City. *Environmental Science & Policy*, *100*, 55-65.

Friedmann, J. (2003). Why do planning theory?. *Planning theory*, *2*(1), 7-10.

Friend, R., Jarvie, J., Reed, S. O., Sutarto, R., Thinphanga, P., & Toan, V. C. (2014). Mainstreaming urban climate resilience into policy and planning; reflections from Asia. *Urban Climate*, *7*, 6-19.

Fünfgeld, H., & McEvoy, D. (2011). Framing climate change adaptation in policy and practice. *Victorian Centre for Climate Change Adaptation Research, Melbourne*.
Füssel, H. M. (2007). Adaptation planning for climate change: concepts, assessment approaches, and key lessons. *Sustainability science*, *2*(2), 265-275.

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). Action research. *Educational Research: An Introduction*. Boston, MA: Pearson Education.

Giddens, A. (1979). *Central problems in social theory: Action, structure, and contradiction in social analysis* (Vol. 241). Berkeley: University of California Press.

Girod, B., Wiek, A., Mieg, H., & Hulme, M. (2009). The evolution of the IPCC's emissions scenarios. *Environmental science & policy*, *12*(2), 103-118.

Glaeser, E. L. (2005). *Reinventing Boston: 1630–2003*. *Journal of Economic Geography*, *5*(2), 119-153.

Godschalk, D. R. (2003). Urban hazard mitigation: creating resilient cities. *Natural hazards review*, *4*(3), 136-143.

Godschalk, D., Beatley, T., Berke, P., Brower, D., & Kaiser, E. J. (1998). *Natural hazard mitigation: Recasting disaster policy and planning*. Washington: Island Press.

Gotham, K. (2019). Fast spectacle: Reflections on Hurricane Katrina and the contradictions of spectacle. *Fast Capitalism*, *2*(2).

Grove, K., Cox, S., & Barnett, A. (2020). Racializing Resilience: Assemblage, Critique, and Contested Futures in Greater Miami Resilience Planning. *Annals of the American Association of Geographers*, 1-18.

Habermas, J. (1981). *Theorie des kommunikativen Handelns*. Frankfurt: Suhrkamp.

Habermas, J. (1987). The theory of communicative action, Volume 2: Lifeworld and system. Cambridge: Polity.

Haggärde, M., & Løkken, G. (2019, September). Complexity, otherness and change in Arctic landscapes—didactic methods and experimental approaches to planning. In *ECLAS and UNISCAPE Annual Conference 2019* (p. 156).

Hall, J. (2002). Sustainable development innovation; a research agenda for the next 10 years. Editorial for the 10th anniversary of the Journal of Cleaner Production. *Journal of Cleaner Production*, *10*(3), 195-196.

Hall, P., & Tewdwr-Jones, M. (2019). *Urban and regional planning*. London: Routledge.

Hansen, K. G., Bitsch, S., & Zalkind, L. (2013). *Urbanization and the role of housing in the present development process in the Arctic*. Stockholm: Nordregio.

Healey, P. (2003). Collaborative planning in perspective. *Planning theory*, *2*(2), 101-123.

Healey, P. (2007). The new institutionalism and the transformative goals of planning. *Institutions and planning*, *61*, 61-87.

Healey, P. (2012). Communicative planning: Practices, concepts, and rhetorics. *Planning Ideas That Matter: Livability, Territoriality, Governance, and Reflective Practice*, *333*.

Heathcott, J. (2012). Planning note: Pruitt-igoe and the critique of public housing. *Journal of the American Planning Association*, *78*(4), 450-451.

Hebbert, M. (2014). Climatology for city planning in historical perspective. *Urban Climate*, *10*, 204-215.

Hillson, D. (Ed.). (2016). *The Risk Management Handbook: A practical guide to managing the multiple dimensions of risk*. Kogan Page Publishers.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual review of ecology and systematics*, *4*(1), 1-23.

Horowitz, A. (2020). *Katrina: A History, 1915-2015*. Cambridge: Harvard University Press.

Huck, A., Monstadt, J., & Driessen, P. (2020). Mainstreaming resilience in urban policy making? Insights from Christchurch and Rotterdam. *Geoforum*. *117,* 194-205.

Hunsinger, E., Sandberg, E. & Whitney, S. (2013). A history of Alaska population settlement, Research and Analysis Section. *Alaska Department of Labor and Workforce Development, Division of Administrative Services*.

Hunt, A., & Watkiss, P. (2011). Climate change impacts and adaptation in cities: a review of the literature. *Climatic change*, *104*(1), 13-49.

Hurlimann, A. C., & March, A. P. (2012). The role of spatial planning in adapting to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, *3*(5), 477-488.

Huxley, M., & Yiftachel, O. (2000). New paradigm or old myopia? Unsettling the communicative turn in planning theory. *Journal of planning education and research*, *19*(4), 333-342.

Innes, J. E., & Booher, D. E. (2018). *Planning with complexity: An introduction to collaborative rationality for public policy*. Oxford: Routledge.

IPCC. (1990). *IPCC First Assessment Report*. Geneva: WMO.

IPCC. (1992). *Climate Change 1992: The Supplementary Report to the IPCC Scientific Assessment*. Cambridge: Cambridge University Press.

IPCC. (2007). *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: WMO.

IPCC. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate. Geneva: WMO.

Irons, M. E. (2018). City official in charge of race dialogue leaves post. Boston Globe. [Online]. Available at: https://www.bostonglobe.com/news/politics/2018/01/18/city-official-charge-race- (Accessed: 26/02/19).

Jabareen, Y. (2013). Planning the resilient city: Concepts and strategies for coping with climate change and environmental risk. *Cities*, *31*, 220-229.

Jha, A. K., Miner, T. W., & Stanton-Geddes, Z. (Eds.). (2013). *Building urban resilience: principles, tools, and practice*. The World Bank.

Joint Federal-State Land Use Planning Commission for Alaska. (1979). The Final Report –Some Guidelines for Deciding Alaska's Future. [Online]. Available at: https://www.arlis.org/docs/vol1/H/921306523.pdf (Accessed: 30/04/19).

Jon, I., & Reghezza-Zitt, M. (2020). Late Modernity to Postmodern? The Rise of Global Resilience and its Progressive Potentials for Local Disaster Planning (Seattle and Paris). *Planning Theory & Practice*, *21*(1), 94-122.

Kalliojärvi, S. (2020). Age of Changes: Threat of Climate Change and Its Meaning for Security. In *Climate Change and Arctic Security* (pp. 9-32). Palgrave Pivot, Cham.

Kanai, J. M. (2014). On the peripheries of planetary urbanization: globalizing Manaus and its expanding impact. *Environment and Planning D: Society and Space*, *32*(6), 1071-1087.

Karaan, A., O'Connor, C., & Kenny, M.J. (2016) Using Planning Expertise in Emergency Humanitarian Response: How to not just 'build back' but 'build back better.' Department of Urban Studies and Planning, the University of Sheffield.

Kennedy, L. W. (1994). Planning the City upon a Hill: Boston since 1630. Boston: University of Massachusetts Press.

Kenny, M.J. (2017)**.** Urban Planning in the Arctic: Historic Approaches and the Potential for a Resilient Urban Future. In: Heininen, L., Exner-Pirot, H., & Plouffe, J. (eds.) (2017). *Arctic Yearbook 2017*. Akureyri, Iceland: Northern Research Forum.

Kim, S. J., Kim, B. S., Jun, H. D., & Kim, H. S. (2010). The evaluation of climate change impacts on the water scarcity of the han river basin in South Korea using high resolution RCM data. *Journal of Korea Water Resources Association*, *43*(3), 295-308.

Koelemaij, J. (2020). Dubaification in practice: an inter-scalar analysis of Belgrade Waterfront. *Urban Geography*, 1-19.

Krasny, M. E., & Tidball, K. G. (2009). Applying a resilience systems framework to urban environmental education. *Environmental education research*, *15*(4), 465-482.

Kraus, E. (1945). Climate made by man. *Quarterly Journal of the Royal Meteorological Society*, *71*(309-310), 397-412.

Krier, L. (2009). *The architecture of community*. Washington: Island Press.

Lang, T. (2011). Urban resilience and new institutional theory–a happy couple for urban and regional studies?. In *German annual of spatial research and policy 2010* (pp. 15-24). Berlin: Springer.

Lees, L. (2004). Urban geography: discourse analysis and urban research. *Progress in human geography*, *28*(1), 101-107.

Leitner, H., Sheppard, E., Webber, S., & Colven, E. (2018). Globalizing urban resilience. *Urban Geography*, *39*(8), 1276-1284.

Lennon, M., & Fox-Rogers, L. (2017). Morality, power and the planning subject. *Planning Theory*, *16*(4), 364-383.

Liao, K. H. (2012). A theory on urban resilience to floods—a basis for alternative planning practices. *Ecology and society*, *17*(4).

Luber, G., & McGeehin, M. (2008). Climate change and extreme heat events. *American journal of preventive medicine*, *35*(5), 429-435.

Major, D. C., Omojola, A., Dettinger, M., Hanson, R. T., & Sanchez-Rodriguez, R. (2011). Climate change, water, and wastewater in cities. *Climate change and cities: first assessment report of the urban climate change research network*, 113-143.

Malhotra, V. K., Fernando, R. L. S., & Haran, N. P. (2020). Disaster Management for 2030 Agenda of the SDG. Berlin: Springer.

Mäntysalo, R. (2005). Approaches to participation in urban planning theories. *Rehabilitation of suburban areas–Brozzi and Le Piagge neighbourhoods*, 23-38.

Manyena, B., O'Brien, G., O'Keefe, P., & Rose, J. (2011). Disaster resilience: a bounce back or bounce forward ability?. *Local Environment: The International Journal of Justice and Sustainability*, *16*(5), 417-424.

Margolis, J. (2017). Anchorage is confronting more rapid climate change, but has few dollars to address it. *Public Radio International*. [Online]. Available at: https://www.pri.org/stories/2017-10-03/anchorage-confronting-more-rapid- (Accessed: 20/11/20).

Markon, C.J. (2008). A Temporal Study of Urban Development for the Municipality of Anchorage, Alaska. *Geocarto International*. 18(3). 21-33.

Martin-Moreau, M., & Menascé, D. (2018). Urban resilience: introducing this issue and summarizing the discussions. *Field Actions Science Reports. The journal of field actions*, (Special Issue 18), 6-11.

Masnavi, M. R., Gharai, F., & Hajibandeh, M. (2019). Exploring urban resilience thinking for its application in urban planning: A review of literature. *International Journal of Environmental Science and Technology*, *16*(1), 567-582.

McBean, G., & Ajibade, I. (2009). Climate change, related hazards and human settlements. *Current Opinion in Environmental Sustainability*, *1*(2), 179-186.

McCarthy, M. P., Best, M. J., & Betts, R. A. (2010). Climate change in cities due to global warming and urban effects. *Geophysical research letters*, *37*(9).

McLellan, E., MacQueen, K. M., & Neidig, J. L. (2003). Beyond the qualitative interview: Data preparation and transcription. *Field methods*, *15*(1), 63-84.

Medd, W., & Marvin, S. (2005). From the politics of urgency to the governance of preparedness: A research agenda on urban vulnerability. *Journal of contingencies and crisis Management*, *13*(2), 44-49.

Meerow, S., & Woodruff, S. C. (2020). Seven Principles of Strong Climate Change Planning. *Journal of the American Planning Association*, *86*(1), 39-46.

Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and urban planning*, *147*, 38-49.

Mehmood, A. (2016). Of resilient places: planning for urban resilience. *European Planning Studies*, *24*(2), 407-419.

Mendizabal, M., Heidrich, O., Feliu, E., García-Blanco, G., & Mendizabal, A. (2018). Stimulating urban transition and transformation to achieve sustainable and resilient cities. *Renewable and Sustainable Energy Reviews*, *94*, 410-418.

Meng, M., Dąbrowski, M., & Stead, D. (2020). Shifts in Spatial Plans for Flood Resilience and Climate Adaptation: Examining Planning Procedure and Planning Mandates. *Sustainability*, *12*(1), 105.

Meriläinen, E. (2020). The dual discourse of urban resilience: robust city and self-organised neighbourhoods. *Disasters*, *44*(1), 125-151.

Metropolitan Area Planning Council. (2014). Metro Boston Regional Climate Adaptation Strategy. [Online]. Available at: http://www.mapc.org/wp-content/uploads/2019/03/RCCAS_full_report_rev_8-28-14.pdf (Accessed: 22/08/19).

Metropolitan Area Planning Council. (2015). Smart Growth and Regional Collaboration. [Online]. Available at: https://www.mapc.org/get-involved/coalitions/mmc/ (Accessed: 21/10/19).

Mileti, D. (1999). *Disasters by design: A reassessment of natural hazards in the United States*. Washington: Joseph Henry Press.

Miller, T. R., Chester, M., & Muñoz-Erickson, T. A. (2018). Rethinking infrastructure in an era of unprecedented weather events. *Issues in Science and technology*, 47-58.

Mills, G. (2008). Luke Howard and the climate of London. *Weather*, *63*(6), 153-157.

Mohl, R, A; Rose, M, H. (2012). The Post-Interstate Era: Planning, Politics and Policy Since the 1970's. *Journal of Planning History*, 11(1), pp.3-7.

Moos, A. I., & Dear, M. J. (1986). Structuration theory in urban analysis: 1. Theoretical exegesis. *Environment and Planning A*, *18*(2), 231-252.

Municipality of Anchorage Long-Range Planning Division. (2019). What we do. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Physical/Pages/default.aspx. (Accessed: 12/04/19).

Municipality of Anchorage Mayor's Corner. (2019). Resilient Anchorage. [Online]. Available at: https://www.muni.org/Departments/Mayor/AWARE/ResilientAnchorage/Pages/def (Accessed: 12/04/19).

Municipality of Anchorage Planning Department. (2019). Planning Department. [Online]. Available at: http://www.muni.org/Departments/OCPD/Planning/Pages/default.aspx. (Accessed: 12/04/19).

Municipality of Anchorage. (1993). Chugiak-Eagle River Comprehensive Plan. *Planning Department: Long-Range Planning Division*. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Documents/C-ERCP_LandUsePlan-r.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (1995). Girdwood Area Plan. *Planning Department: Long-Range Planning Division*. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Documents/GAP0-1995-CompleteDocument.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2001). Anchorage 2020 - Anchorage Bowl Comprehensive Plan. *Planning Department: Long-Range Planning Division*. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Documents/f2020__chapt_1.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2006). Chugiak-Eagle River Comprehensive Plan Update. *Planning Department: Long-Range Planning Division*. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Publications/Documents/Chugiak-Eagle%20River%20Comprehensive%20Plan%20Update%202006/Chugiak-Eagle%20River%20Comprehensive%20Plan%20Update%202006.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2007). Anchorage Coastal Management Plan. *Planning Department: Long-Range Planning Division*. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Publications/Anc%20Coastal%20Management%20Plan/Full_Doc.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2007). Destination Downtown: Anchorage Downtown Comprehensive Plan. *Planning Department: Long-Range Planning Division*. [Online]. Available at: http://anchoragedowntown.org/wp-content/uploads/2018/08/AnchorageDowntownComprehensivePlan-1.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2009). Turnagain Arm Comprehensive Plan. *Planning Department: Long-Range Planning Division*. [Online]. Available at: http://wwwtst.muni.org/Departments/OCPD/Planning/Publications/Documents/TurnagainArmCompPlan-2009.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2016). All Hazards Mitigation Plan Update. *Department of Project Management and Engineering*. [Online]. Available at: https://www.muni.org/departments/project_management/documents/public_involvement_plan.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2017) Anchorage Energy Landscape and Opportunities Analysis. *Deerstone Consulting, Crimp Energy Consulting*.[Online]. Available at: https://static1.squarespace.com/static/59839b7815d5dbb2e6387c94/t/5988bcad3e00be429f4b7b3e/1502133442520/MOA+Report+May+2017_websize-FINAL.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2017). Anchorage 2040 Land Use Plan. *Municipality of Anchorage Planning Department: Long-Range Planning Division*. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Documents/Anchorage%202040%20Land%20Use%20Plan/Anch2040%20LUP-all.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2017). Resilient Anchorage Roadmap. *Aware: A Welcoming and Resilient Anchorage*. [Online]. Available at: https://www.muni.org/departments/mayor/aware/resilientanchorage/documents/resilient%20anchorage%20roadmap.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2017). Welcoming Anchorage Roadmap. *Aware: A Welcoming and Resilient Anchorage*. [Online]. Available at: https://www.muni.org/Departments/Mayor/WelcomingAnchorage/Documents/Roadmap_DRAFT9with.appendices.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2019). Anchorage Climate Action Plan. [Online]. Available at: https://www.muni.org/departments/mayor/aware/resilientanchorage/documents/2019%20anchorage%20climate%20action%20plan_adopted.pdf (Accessed: 19/10/20).

Municipality of Anchorage. (2019). Draft Anchorage Climate Action Plan. [Online]. Available at: http://bonnernetwork.pbworks.com/f/Climate+Action+Plan+2009.pdf (Accessed: 16/11/19).

Municipality of Anchorage. (2019). Municipality of Anchorage Climate Action Strategy. [Online]. Available at: http://akclimateaction.com/files/2019-09-07_13_27_46_moa_climate_action_strategy_adopted.pdf (Accessed: 19/10/20).

Muñoz-Erickson, T., Miller, C. A., & Miller, T. R. (2017). How Cities Think: Knowledge Co-Production for Urban Sustainability and Resilience. Forests 8 (6), 203.

Murray, V., Maini, R., Clarke, L., & Eltinay, N. (2017). Coherence between the Sendai Framework, the SDGs, the Climate Agreement. *New Urban Agenda and World Humanitarian Summit, and the role of science in their implementation*, 5-8.
Nasiri, Noura Al, Talal Al-Awadhi, Mohamed Hereher, Reazul Ahsan, and AL Ghaliya AlRubkhi. (2020). Changing Urban Ecology a Challenge for Coastal Urban Resilience: A Study on Muscat. *Environment and Urbanization ASIA*. 11(1). 20-28.

NatCatService. (2020). Data on natural disasters since 1980. [Online]. Available at: https://www.munichre.com/en/solutions/for-industry-clients/natcatservice.html (Accessed: 13/12/20).

Nelson, F. E., Anisimov, O. A., & Shiklomanov, N. I. (2002). Climate change and hazard zonation in the circum-Arctic permafrost regions. Natural Hazards, 26(3), 203-225.

Newman, O. (1972). Defensible space: Crime prevention through urban design. New York: Macmillan.

Noble, H., & Smith, J. (2015). Issues of validity and reliability in qualitative research. *Evidence-based nursing*, *18*(2), 34-35.

Normandin, J. M., Therrien, M. C., Pelling, M., & Paterson, S. (2019). *Urban resilience for risk and adaptation governance*. Berlin: Springer.

O'Brien, P., Lord, A., & Dembski, S. (2020). How do planners manage risk in alternative land development models? An institutional analysis of land development in the Netherlands. *Land Use Policy*, *91*, 104409.

O'Brien, G., O'Keefe, P., Rose, J., & Wisner, B. (2006). Climate change and disaster management. *Disasters*, *30*(1), 64-80.

O'Connor, T. H. (1995). Building a New Boston: Politics and Urban Renewal, 1950-1970. Beirut: UPNE.

Olazabal, M., & de Gopegui, M. R. (2020). ¿ Para qué impactos climáticos se preparan las ciudades españolas?. *Ekonomiaz: Revista vasca de economía*, (97), 212-239.

Pacione, M. (2005). Dubai. *Cities*, *22*(3), 255-265.

Pearce, T., Ford, J. D., Caron, A., & Kudlak, B. P. (2012**).** Climate change adaptation planning in remote, resource-dependent communities: an Arctic example. *Regional Environmental Change*. 12(4), 825-837.

Pendall, R., Foster, K. A., & Cowell, M. (2010). Resilience and regions: building understanding of the metaphor. *Cambridge Journal of Regions, Economy and Society*, *3*(1), 71-84.

Pike, A., Dawley, S., & Tomaney, J. (2010). Resilience, adaptation and adaptability. *Cambridge journal of regions, economy and society*, *3*(1), 59-70.

Pitidis, V., & Coaffee, J. (2020). Catalysing governance transformations through urban resilience implementation: The case of Thessaloniki, Greece. *Cities*, *107*, 102934.

Pitidis, V., Tapete, D., Coaffee, J., Kapetas, L., & Porto de Albuquerque, J. (2018). Understanding the implementation challenges of urban resilience policies: investigating the influence of urban geological risk in Thessaloniki, Greece. *Sustainability*, *10*(10), 3573.

Porter, L., & Davoudi, S. (2012). The politics of resilience for planning: A cautionary note. *Planning Theory and Practice*, *13*(2), 329-333.

Pressman, N., & Zepic, X. (1986). Planning in cold climates: a critical overview of Canadian settlement patterns and policies. University of Winnipeg: Institute of Urban Studies.

Preston-Jones, A. (2020). The Importance of Climate Change Education in Urban Planning: A Review of Planning Courses at UK Universities. In *Climate Change, Hazards and Adaptation Options* (pp. 1045-1067). New York: Springer.

Quarantelli, E. L. (1995). *Emergent behaviors and groups in the crisis time of disasters*. Disaster Research Center, University of Delaware.

Renes, H., & Piastra, S. (2011). Polders and politics: new agricultural landscapes in Italian and Dutch wetlands, 1920s to 1950s. *Landscapes*, *12*(1), 24-41.

Richardson, T. (1996). Foucauldian discourse: Power and truth in urban and regional policy making. *European Planning Studies*, *4*(3), 279-292.

Rizzo, A. (2014). Rapid urban development and national master planning in Arab Gulf countries. Qatar as a case study. *Cities*, *39*, 50-57.
Rockefeller Foundation. (2016). Boston's Resilience Challenge. [Online]. Available at: http://www.100resilientcities.org/cities/boston/. (Accessed: 29/10/19).

Rockefeller Foundation. (2018). 100 Resilient Cities - About Us. [Online]. Available at: https://www.100resilientcities.org/about-us/. (Accessed: 10/10/19).

Røe, P. G. (2000). Qualitative research on intra-urban travel: an alternative approach. *Journal of Transport Geography*, *8*(2), 99-106.

Rogers, P. (2016). *Resilience & the city: Change, (dis)order and disaster*. Oxford: Routledge.

Romero-Lankao, P., Gnatz, D. M., Wilhelmi, O., & Hayden, M. (2016). Urban sustainability and resilience: From theory to practice. *Sustainability*, *8*(12), 1224.

Rosen, Y. (2019). Alaska's biggest city adopts a climate change plan to cope with effects of warming. *Arctic Today*. [Online]. Available at: https://www.arctictoday.com/alaskas-biggest-city-adopts-a-climate-change-plan-to-cope-with-effects-of-warming/8712203811_c8b67c90ef_k/ (Accessed 17/10/19).

Rosenzweig, C., Solecki, W., Hammer, S. A., & Mehrotra, S. (2010). Cities lead the way in climate–change action. *Nature*, *467*(7318), 909-911.

Royal Society. (2014). Resilience to extreme weather. [Online]. Aailable at: https://royalsociety.org/-/media/policy/projects/resilience-climate-change/resilience-full-report.pdf (Accessed 14/11/20).

Ruskin, L. (2015). Murkowski, Sullivan Agree Climate is Changing but Split on Naming Cause. *Alaska Public Media*. [Online]. Available at:

https://www.alaskapublic.org/2015/01/23/murkowski-sullivan-agree-climate-is-changing-but-split-on-naming-cause/ (Accessed 18/07/19).

Rydin, Y. (2003). In pursuit of sustainable development: rethinking the planning system. *RICS Foundation*. [Online]. Available at: https://discovery.ucl.ac.uk/id/eprint/92253/1/92253.pdf (Accessed: 23/11/20).

Rydin, Y. (2011). *The purpose of planning: Creating sustainable towns and cities*. Bristol: Policy Press.

Sanchez, A. X., Van der Heijden, J., & Osmond, P. (2018). The city politics of an urban age: urban resilience conceptualisations and policies. *Palgrave Communications*, *4*(1), 1-12.

Sassen, S. (2002). Global cities and survival circuits. *American studies: An anthology*, 185-93.

Satterthwaite, D. (2008). Cities' contribution to global warming: notes on the allocation of greenhouse gas emissions. *Environment and urbanization*, *20*(2), 539-549.

Satterthwaite, D., & Dodman, D. (2013). Towards resilience and transformation for cities within a finite planet. Environment and Urbanization. 25(2).

Schmidt, S., & Buehler, R. (2007). The planning process in the US and Germany: a comparative analysis. *International Planning Studies*, *12*(1), 55-75.

Schroeder, A., Wamsley, G., & Ward, R. (2001). The evolution of emergency management in America: From a painful past to a promising but uncertain future. *Public Administration and Public Policy*, *93*, 357-418.

Schuetze, T., & Chelleri, L. (2011). Climate adaptive urban planning and design with water in Dutch polders. *Water Science and Technology*, *64*(3), 722-730.

Scott, J., 1990, A Matter of Record, Documentary Sources in Social Research, Cambridge: Polity Press.
Seasholes, N, S. (2003). Gaining Ground: A History of Landmaking in Boston. Boston: The MIT Press.

Shamsuddin, S. (2020). Resilience resistance: The challenges and implications of urban resilience implementation. *Cities*, 102763.

Sharifi, A., & Yamagata, Y. (2014). Resilient urban planning: Major principles and criteria. *Energy Procedia*, *61*, 1491-1495.

Sharifi, A., & Yamagata, Y. (2018). Resilience-oriented urban planning. In *Resilience-Oriented Urban Planning* (pp. 3-27). New York: Springer.

Shaw, R., & Sharma, A. (2011). *Climate and Disaster Resilience in Cities*. Bingley: Emerald Group Publishing Limited.

Shaw, K. (2012). The rise of the resilient local authority?. *Local Government Studies*, *38*(3), 281-300.

Simonović, S. P. (2012). *Floods in a changing climate: risk management*. Cambridge: Cambridge University Press.

Spoormans, L., Navas Carrillo, D., Zijlstra, H., & Pérez Cano, M. T. (2019). Planning history of a Dutch new town: Analysing Lelystad through its residential neighbourhoods. *Urban Planning, 4 (3), 102-116*.

Steinecke, K. (1999). Urban climatological studies in the Reykjavık subarctic environment, Iceland. *Atmospheric environment*, *33*(24-25), 4157-4162.

Stojanovic, D., Koch, A. J., Webb, M., Cunningham, R., Roshier, D., & Heinsohn, R. (2014). Validation of a landscape-scale planning tool for cavity-dependent wildlife. *Austral Ecology*, *39*(5), 579-586.

Tewdwr-Jones, M., & Allmendinger, P. (1998). Deconstructing communicative rationality: a critique of Habermasian collaborative planning. *Environment and planning A*, *30*(11), 1975-1989.

Therrien, M. C., Usher, S., & Matyas, D. (2020). Enabling strategies and impeding factors to urban resilience implementation: A scoping review. *Journal of Contingencies and Crisis Management*, *28*(1), 83-102.

Tollin, N. (2015). The role of cities and local authorities following COP21 and the Paris Agreement. *16*(1), 43-51.

Townsend, F. (2006,). The federal response to Hurricane Katrina: Lessons learned. Washington, DC: U.S. Government Printing Office.

Turner III, D. W. (2010). Qualitative interview design: A practical guide for novice investigators. *The qualitative report*, *15*(3), 754-760.

Turner, N. J., Gregory, R., Brooks, C., Failing, L., & Satterfield, T. (2008). From invisibility to transparency: identifying the implications. *Ecology and society*, *13*(2).

Tyler, N., & Ward, R. M. (2011). *Planning and community development: A guide for the 21st century*. WW Norton.

UN-Habitiat. (2014). Planning for Climate Change: A strategic, values-based approach for urban planners. Cities and Climate Change Initiative Tool Series.

UNISDR. (2004). *Living with Risk: A global review of disaster reduction initiatives*. Geneva: United Nations

United Nations., Sohn, L.B. (1973). The Stockholm Declaration on the Human Environment. *The Harvard International Law Journal*. 423.

United Nations. (2015). *Transforming our world : the 2030 Agenda for Sustainable Development*. Geneva: United Nations.

United Nations Office of Disaster Risk Reduction. (2019). Making Cities Resilient Report 2019: A snapshot of how local governments progress in reducing disaster risks in alignment with the Sendai Framework for Disaster Risk Reduction. New York.

United States Census Bureau. (2012). 2010 Census Urban Area List. [Online]. Available at: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html (Accessed: 19/10/20).

University of Alaska, Anchorage. (2009). Proposed Climate Action Plan for the Municipality of Anchorage. *Climate Change Action Team (C-CAT)*. [Online]. Available at: http://bonnernetwork.pbworks.com/f/Climate+Action+Plan+2009.pdf (Accessed: 19/10/20).

van de Ven, F. H., Snep, R. P., Koole, S., Brolsma, R., Van Der Brugge, R., Spijker, J., & Vergroesen, T. (2016). Adaptation Planning Support Toolbox: Measurable performance information based tools for co-creation of resilient, ecosystem-based urban plans with urban designers, decision-makers and stakeholders. *Environmental Science & Policy*, *66*, 427-436.

van den Berg, H. J., & Keenan, J. M. (2019). Dynamic vulnerability in the pursuit of just adaptation processes: A Boston case study. *Environmental science & policy*, *94*, 90-100.

Wakefield, S. (2019). Miami Beach forever? Urbanism in the back loop. *Geoforum*, *107*, 34-44.

Wakeman, R. (2014). Rethinking postwar planning history. *Planning Perspectives*, *29*(2), 153-163.

Walker, B., Gunderson, L., Kinzig, A., Folke, C., Carpenter, S., & Schultz, L. (2006). A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and society*, *11*(1).

Walker, J., & Cooper, M. (2011). Genealogies of resilience: From systems ecology to the political economy of crisis adaptation. *Security dialogue*, *42*(2), 143-160.

Wamsler, C. (2004). Managing urban risk: perceptions of housing and planning as a tool for reducing disaster risk. *Global Built Environment Review*, *4*(2), 11-28.

Wamsler, C. (2008). Planning ahead: adapting settlements before disasters strike. *Hazards and the built environment: attaining built-in resilience*, 31-354.

Wamsler, C., Wickenberg, B., Hanson, H., Olsson, J. A., Stålhammar, S., Björn, H., & Torffvit, F. (2020). Environmental and climate policy integration: Targeted strategies for overcoming barriers to nature-based solutions and climate change adaptation. *Journal of Cleaner Production*, *247*, 119154.

Wardekker, A., Wilk, B., Brown, V., Uittenbroek, C., Mees, H., Driessen, P. & Runhaar, H. (2020). A diagnostic tool for supporting policymaking on urban resilience. *Cities*, *101*, 102691.

Watson, B. (2014). What makes a city resilient?. *The Guardian*.[Online]. Available at: https://www.theguardian.com/cities/2014/jan/27/what-makes-a-city-resilient (Accessed: 02/12/20).

White, I., & O'Hare, P. (2014). From rhetoric to reality: which resilience, why resilience, and whose resilience in spatial planning?. *Environment and Planning C: Government and Policy*, *32*(5), 934-950.

Whitehill, W. M; Kennedy, L, W. (2000). Boston: A Topographical History. Boston: Harvard University Press.

Wilkinson, C. (2011). Strategic navigation: in search of an adaptable mode of strategic spatial planning practice. *Town Planning Review*, *82*(5), 595-613.

Wilkinson, C. (2012). Social-ecological resilience: Insights and issues for planning theory. *Planning theory*, *11*(2), 148-169.

Wilkinson, C., Porter, L., & Colding, J. (2010). Metropolitan planning and resilience thinking: A practitioner's perspective. *Critical Planning*, *17*(17), 2-20.

World Bank. (2020). Joint Report on Multilateral Development Banks' Climate Finance. [Online]. Available at: https://www.eib.org/attachments/press/1257-joint-report-on-mdbs-climate-finance-2019.pdf (Accessed: 12/10/20).
World Meteorological Organisation. (1979). Proceedings of the World Climate Conference – a conference of experts on climate and Mankind. Geneva: WMO.

Yin, R, K. (2009). Case Study Research Design and Methods (4th ed.). Thousand Oaks, CA: Sage Publishing

Yin, R, K. (2014). Case Study Research Design and Methods (5th ed.). Thousand Oaks: Sage Publishing.

Young, D. (2005). The Arctic Climate Impact Assessment (ACIA) and Climate Change – Press Release. *Don Young – Congressman for All Alaska*. [Online]. Available at: https://donyoung.house.gov/news/documentsingle.aspx?DocumentID=128198. (Accessed: 23/09/19).

Zandvoort, M., Campos, I. S., Vizinho, A., Penha-Lopes, G., Lorencová, E. K., van der Brugge, R., & Jeuken, A. B. (2017). Adaptation pathways in planning for

uncertain climate change: Applications in Portugal, the Czech Republic and the Netherlands. *Environmental Science & Policy*, *78*, 18-26.

Zebrowski, C. (2020). Acting local, thinking global: Globalizing resilience through 100 Resilient Cities. *New Perspectives*, *28*(1), 71-88.

Zhang, X., & Li, H. (2018). Urban resilience and urban sustainability: What we know and what do not know?. *Cities*, *72*, 141-148.

Zhang, Y. (2019). City Sets out a 'Bold Vision' for Moakley Park. *Dorchester Reporter*. [Online]. Available at: https://www.dotnews.com/2019/city-sets-out-bold-vision-moakley-park (Accessed: 23/10/20).

Zhao, L. (2018). Urban growth and climate adaptation. *Nature*. *8*(12), 1034.

Zuniga-Teran, A. A., Staddon, C., de Vito, L., Gerlak, A. K., Ward, S., Schoeman, Y & Booth, G. (2020). Challenges of mainstreaming green infrastructure in built environment professions. *Journal of Environmental Planning and Management*, *63*(4), 710-732.

Images

Alaska Department of Fish. (2017). Anchorage Topographic Map. [Online]. Available at: https://en-gb.topographic-map.com/maps/fift/Anchorage/ (Accessed: 13/04/20).

Alaska Division of Forestry. (2019). Smoke rises from a wildfire in East Anchorage on Tuesday afternoon, July 2, 2019. [Online]. Available at: https://akfireinfo.com/2019/07/02/wildfire-in-east-anchorage-30-percent-contained-evacuations-lifted/ (Accessed: 07/04/20).

Anchorage Daily News. (2015). Earthquake damage assessments continue amid aftershocks. [Online]. Available at: https://www.adn.com/alaska-news/2018/12/01/it-will-be-in-the-millions-of-dollars-earthquake-damage-assessments-other-info-for-saturday/ (Accessed: 24/06/20).

Anchorage Daily News. (2019). An aerial view of downtown Anchorage. [Online]. Available at: https://www.adn.com/opinions/2018/02/24/downtown-anchorage-is-on-the-verge-of-a-renaissance-thanks-to-this-new-strategy/ (Accessed: 21/11/20).

Anchorage Geographic and Data Information Centre. (2019). MOA Boundary. [Online]. Available at: https://data-muniorg.hub.arcgis.com/datasets/moa-boundary-hosted/data (Accessed: 13/11/19).

Architecture 2030. (2019). Sea Level Rise in Boston. [Online]. Available at: https://ocean.si.edu/conservation/climate-change/map-boston-3-meter-sea-level-rise (Accessed: 26/09/19).

Baker, F. (2018) 1964 Anchorage. [Online]. Available at: https://www.echoak.com/2018/03/1964-earthquake-story/ (Accessed: 21/11/20).

Becker, D. (2019). Figure ground map of Boston. [Online]. Available at: http://www.dombecker.com/urban-context-figure-ground (Accessed: 16/05/20).

Boston Globe. (2018). Here's how bad Thursday's flooding was. [Online]. Available at: https://www.bostonglobe.com/metro/2018/01/04/here-how-bad-coastal-flooding-was-during-thursday-storm/HCU6EZbtcN94FfScmuGM3M/story.html (Accessed: 29/03/19).

Boston Magazine. (2020). The best views around Boston. [Online]. Available at: https://www.bostonmagazine.com/arts-entertainment/best-views-around-boston/ (Accessed: 28/09/20).

BPDA. (2019). Land Use Map of Boston. [Online]. Available at: http://ww1.bostonredevelopmentauthority.org.html (Accessed: 13/11/19).

City of Boston. (2016). Climate Ready Boston. [Online]. Available at: https://www.boston.gov/sites/default/files/document-file-12-2016/brag_report_-_final.pdf (Accessed: 24/02/20).

City of Boston. (2019). 2019 Climate Action Plan Update. [Online]. Available at: https://www.boston.gov/sites/default/files/imce-uploads/2019-10/city_of_boston_2019_climate_action_plan_update_2.pdf (Accessed: 13/11/19).

City of Boston. (2019). Moakley Park Vision Plan. [Online]. Available at: https://www.boston.gov/moakley-park-vision-plan (Accessed: 24/02/20).

City of Boston. (2020). Boston Boundary. [Online]. Available at: https://bostonopendata-boston.opendata.arcgis.com/datasets/boston-landmarks-commission-blc-historic-districts?showData=true (Accessed: 23/05/20).

Google Earth. (2019). Anchorage. Available at: https://earth.google.com/web/@61.0049075,-150.04048572,377.92243912a,131121.68276187d,35y,335.74012568h,0t,0r (Accessed: 13/11/19).

Google Earth. (2020). Boston. [Online]. Available at: https://earth.google.com/web/@42.38032271,-71.04275711,-1.15409679a,73543.36977074d,35y,15.75770311h,0t,0r (Accessed: 04/04/20).

Municipality of Anchorage. (2017). Land Use Map. [Online]. Available at: https://www.muni.org/Departments/OCPD/Planning/Documents/Anchorage%202040%20Land%20Use%20Plan/Anch%202040%20LUP%20Final%20Documents/AO2017-0116-ANCH%202040%20LUP_Exhibit%20A-Replacement-Document-Maps.pdf (Accessed: 19/08/20).

Municipality of Anchorage. (2019). Objectives 5 & 8 – Climate Action Plan. [Online]. Available at: https://www.muni.org/Departments/Mayor/AWARE/resilientanchorage/pages/climateactionplan.aspx (Accessed: 18/12/19).

Open Street Map. (2019). Anchorage. [Online]. Available at: https://www.openstreetmap.org/#map=9/61.2126/-149.7131 (Accessed: 13/11/19).

Open Street Map. (2020). Boston. [Online]. Available at: https://www.openstreetmap.org/search?query=boston#map=11/42.3125/-70.9979 (Accessed: 23/05/20).